

# $B^\pm/B^0$ ADMIXTURE

## $B$ DECAY MODES

The branching fraction measurements are for an admixture of  $B$  mesons at the  $\Upsilon(4S)$ . The values quoted assume that  $B(\Upsilon(4S) \rightarrow B\bar{B}) = 100\%$ .

For inclusive branching fractions, e.g.,  $B \rightarrow D^\pm$  anything, the treatment of multiple  $D$ 's in the final state must be defined. One possibility would be to count the number of events with one-or-more  $D$ 's and divide by the total number of  $B$ 's. Another possibility would be to count the total number of  $D$ 's and divide by the total number of  $B$ 's, which is the definition of average multiplicity. The two definitions are identical if only one  $D$  is allowed in the final state. Even though the "one-or-more" definition seems sensible, for practical reasons inclusive branching fractions are almost always measured using the multiplicity definition. For heavy final state particles, authors call their results inclusive branching fractions while for light particles some authors call their results multiplicities. In the  $B$  sections, we list all results as inclusive branching fractions, adopting a multiplicity definition. This means that inclusive branching fractions can exceed 100% and that inclusive partial widths can exceed total widths, just as inclusive cross sections can exceed total cross section.

$\bar{B}$  modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing.

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level
<b>Semileptonic and leptonic modes</b>		
$\Gamma_1$ $e^+\nu_e$ anything	[a] ( $10.72 \pm 0.13$ ) %	NODE=S049;CLUMP=L DESIG=100
$\Gamma_2$ $\bar{p}e^+\nu_e$ anything	< $5.9 \times 10^{-4}$ CL=90%	DESIG=140
$\Gamma_3$ $\mu^+\nu_\mu$ anything	[a] ( $10.72 \pm 0.13$ ) %	DESIG=102
$\Gamma_4$ $\ell^+\nu_\ell$ anything	[a,b] ( $10.72 \pm 0.13$ ) %	DESIG=131
$\Gamma_5$ $D^-\ell^+\nu_\ell$ anything	[b] ( $2.8 \pm 0.9$ ) %	DESIG=148
$\Gamma_6$ $\bar{D}^0\ell^+\nu_\ell$ anything	[b] ( $7.2 \pm 1.4$ ) %	DESIG=147
$\Gamma_7$ $\bar{D}\ell^+\nu_\ell$	( $2.39 \pm 0.12$ ) %	DESIG=274
$\Gamma_8$ $\bar{D}\tau^+\nu_\tau$	( $1.05 \pm 0.18$ ) %	DESIG=267
$\Gamma_9$ $D^{*-}\ell^+\nu_\ell$ anything	[c] ( $6.7 \pm 1.3$ ) $\times 10^{-3}$	DESIG=182
$\Gamma_{10}$ $D^{*0}\ell^+\nu_\ell$ anything		DESIG=183
$\Gamma_{11}$ $D^*\ell^+\nu_\ell$	[d] ( $4.95 \pm 0.11$ ) %	DESIG=280;OUR EVAL; $\rightarrow$ UNCHECKED $\leftarrow$
$\Gamma_{12}$ $D^*\tau^+\nu_\tau$	( $1.64 \pm 0.15$ ) %	DESIG=268
$\Gamma_{13}$ $\bar{D}^{**}\ell^+\nu_\ell$	[b,e] ( $2.7 \pm 0.7$ ) %	DESIG=217
$\Gamma_{14}$ $\bar{D}_1(2420)\ell^+\nu_\ell$ anything	( $3.8 \pm 1.3$ ) $\times 10^{-3}$ S=2.4	DESIG=11
$\Gamma_{15}$ $D\pi\ell^+\nu_\ell$ anything + $D^*\pi\ell^+\nu_\ell$ anything	( $2.6 \pm 0.5$ ) % S=1.5	DESIG=34
$\Gamma_{16}$ $D\pi\ell^+\nu_\ell$ anything	( $1.5 \pm 0.6$ ) %	DESIG=232
$\Gamma_{17}$ $D^*\pi\ell^+\nu_\ell$ anything	( $1.9 \pm 0.4$ ) %	DESIG=233
$\Gamma_{18}$ $\bar{D}_2^*(2460)\ell^+\nu_\ell$ anything	( $4.4 \pm 1.6$ ) $\times 10^{-3}$	DESIG=12
$\Gamma_{19}$ $D^{*-}\pi^+\ell^+\nu_\ell$ anything	( $1.00 \pm 0.34$ ) %	DESIG=13
$\Gamma_{20}$ $D_s^-\ell^+\nu_\ell$ anything	[b] < $7 \times 10^{-4}$ CL=90%	DESIG=36
$\Gamma_{21}$ $D_s^-\ell^+\nu_\ell K^+$ anything	[b] < $5 \times 10^{-4}$ CL=90%	DESIG=37
$\Gamma_{22}$ $D_s^-\ell^+\nu_\ell K^0$ anything	[b] < $7 \times 10^{-4}$ CL=90%	DESIG=38
$\Gamma_{23}$ $X_c\ell^+\nu_\ell$	( $10.51 \pm 0.13$ ) %	DESIG=260
$\Gamma_{24}$ $X_u\ell^+\nu_\ell$	( $2.12 \pm 0.31$ ) $\times 10^{-3}$	DESIG=259
$\Gamma_{25}$ $K^+\ell^+\nu_\ell$ anything	[b] ( $6.2 \pm 0.5$ ) %	DESIG=117
$\Gamma_{26}$ $K^-\ell^+\nu_\ell$ anything	[b] ( $10 \pm 4$ ) $\times 10^{-3}$	DESIG=118
$\Gamma_{27}$ $K^0/\bar{K}^0\ell^+\nu_\ell$ anything	[b] ( $4.5 \pm 0.5$ ) %	DESIG=119

**$D, D^*, \text{ or } D_s$  modes**

$\Gamma_{28}$	$D^\pm$ anything	( 23.7 $\pm$ 1.3 ) %	NODE=S049;CLUMP=M
$\Gamma_{29}$	$D^0 / \bar{D}^0$ anything	( 62.7 $\pm$ 2.9 ) %	DESIG=116
$\Gamma_{30}$	$D^*(2010)^\pm$ anything	( 22.5 $\pm$ 1.5 ) %	DESIG=107
$\Gamma_{31}$	$D^*(2007)^0$ anything	( 26.0 $\pm$ 2.7 ) %	DESIG=111
$\Gamma_{32}$	$D_s^\pm$ anything	[f] ( 8.3 $\pm$ 0.8 ) %	DESIG=35
$\Gamma_{33}$	$D_s^{*\pm}$ anything	( 6.3 $\pm$ 1.0 ) %	DESIG=113
$\Gamma_{34}$	$D_s^{*\pm} \bar{D}^(*)$	( 3.4 $\pm$ 0.6 ) %	DESIG=57
$\Gamma_{35}$	$\bar{D} D_{s0}(2317)$		DESIG=58
$\Gamma_{36}$	$\bar{D} D_{sJ}(2457)$		DESIG=248
$\Gamma_{37}$	$D^{(*)} \bar{D}^{(*)} K^0 + D^{(*)} \bar{D}^{(*)} K^\pm$	[f,g] ( 7.1 $\pm$ 2.7 ) %	DESIG=249
$\Gamma_{38}$	$b \rightarrow c \bar{c} s$	( 22 $\pm$ 4 ) %	DESIG=51
$\Gamma_{39}$	$D_s^{(*)} \bar{D}^{(*)}$	[f,g] ( 3.9 $\pm$ 0.4 ) %	DESIG=52
$\Gamma_{40}$	$D^* D^*(2010)^\pm$	[f] < 5.9 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=54
$\Gamma_{41}$	$D D^*(2010)^\pm + D^* D^\pm$	[f] < 5.5 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=55
$\Gamma_{42}$	$D D^\pm$	[f] < 3.1 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=56
$\Gamma_{43}$	$D_s^{(*)\pm} \bar{D}^{(*)} X(n\pi^\pm)$	[f,g] ( 9 $\pm$ 5 ) %	DESIG=53
$\Gamma_{44}$	$D^*(2010)\gamma$	< 1.1 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=180
$\Gamma_{45}$	$D_s^+ \pi^-, D_s^{*+} \pi^-, D_s^+ \rho^-, D_s^{*+} \rho^-, D_s^+ \pi^0, D_s^{*+} \pi^0, D_s^+ \eta, D_s^{*+} \eta, D_s^+ \rho^0, D_s^{*+} \rho^0, D_s^+ \omega, D_s^{*+} \omega$	[f] < 4 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=210
$\Gamma_{46}$	$D_{s1}(2536)^+$ anything	< 9.5 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=32

**Charmonium modes**

$\Gamma_{47}$	$J/\psi(1S)$ anything	( 1.094 $\pm$ 0.032 ) %	S=1.1	NODE=S049;CLUMP=N
$\Gamma_{48}$	$J/\psi(1S)$ (direct) anything	( 7.8 $\pm$ 0.4 ) $\times 10^{-3}$	S=1.1	DESIG=106
$\Gamma_{49}$	$\psi(2S)$ anything	( 3.07 $\pm$ 0.21 ) $\times 10^{-3}$		DESIG=23
$\Gamma_{50}$	$\chi_{c1}(1P)$ anything	( 3.86 $\pm$ 0.27 ) $\times 10^{-3}$		DESIG=124
$\Gamma_{51}$	$\chi_{c1}(1P)$ (direct) anything	( 3.20 $\pm$ 0.25 ) $\times 10^{-3}$		DESIG=170
$\Gamma_{52}$	$\chi_{c2}(1P)$ anything	( 1.3 $\pm$ 0.4 ) $\times 10^{-3}$	S=1.9	DESIG=24
$\Gamma_{53}$	$\chi_{c2}(1P)$ (direct) anything	( 1.65 $\pm$ 0.31 ) $\times 10^{-3}$		DESIG=21
$\Gamma_{54}$	$\eta_c(1S)$ anything	< 9 $\times 10^{-\mathcal{E}_L} = 90\%$		DESIG=247
$\Gamma_{55}$	$K X(3872) \times B(X \rightarrow D^0 \bar{D}^0 \pi^0)$	( 1.2 $\pm$ 0.4 ) $\times 10^{-4}$		DESIG=22
$\Gamma_{56}$	$K X(3872) \times B(X \rightarrow D^{*0} D^0)$	( 8.0 $\pm$ 2.2 ) $\times 10^{-5}$		DESIG=264
$\Gamma_{57}$	$K X(3940) \times B(X \rightarrow D^{*0} D^0)$	< 6.7 $\times 10^{-\mathcal{E}_L} = 90\%$		DESIG=273
$\Gamma_{58}$	$K X(3915) \times B(X \rightarrow \omega J/\psi)$	[h] ( 7.1 $\pm$ 3.4 ) $\times 10^{-5}$		DESIG=262

 **$K$  or  $K^*$  modes**

$\Gamma_{59}$	$K^\pm$ anything	[f] ( 78.9 $\pm$ 2.5 ) %	NODE=S049;CLUMP=O	
$\Gamma_{60}$	$K^+$ anything	( 66 $\pm$ 5 ) %	DESIG=105	
$\Gamma_{61}$	$K^-$ anything	( 13 $\pm$ 4 ) %	DESIG=120	
$\Gamma_{62}$	$K^0 / \bar{K}^0$ anything	[f] ( 64 $\pm$ 4 ) %	DESIG=121	
$\Gamma_{63}$	$K^*(892)^\pm$ anything	( 18 $\pm$ 6 ) %	DESIG=122	
$\Gamma_{64}$	$K^*(892)^0 / K^*(892)^0$ anything	[f] ( 14.6 $\pm$ 2.6 ) %	DESIG=223	
$\Gamma_{65}$	$K^*(892)\gamma$	( 4.2 $\pm$ 0.6 ) $\times 10^{-5}$	DESIG=224	
$\Gamma_{66}$	$\eta K\gamma$	( 8.5 $\pm$ 1.8 ) $\times 10^{-6}$	DESIG=126	
$\Gamma_{67}$	$K_1(1400)\gamma$	< 1.27 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=263	
$\Gamma_{68}$	$K_2^*(1430)\gamma$	( 1.7 $\pm$ 0.6 ) $\times 10^{-5}$	DESIG=127	
$\Gamma_{69}$	$K_2(1770)\gamma$	< 1.2 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=128	
$\Gamma_{70}$	$K_3^*(1780)\gamma$	< 3.7 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=179	
$\Gamma_{71}$	$K_4^*(2045)\gamma$	< 1.0 $\times 10^{-\mathcal{E}_L} = 90\%$	DESIG=129	
$\Gamma_{72}$	$K \eta'(958)$	( 8.3 $\pm$ 1.1 ) $\times 10^{-5}$	DESIG=178	
				DESIG=226

$\Gamma_{73}$	$K^*(892)\eta'(958)$	( 4.1 $\pm$ 1.1 ) $\times 10^{-6}$	DESIG=227
$\Gamma_{74}$	$K\eta$	< 5.2 $\times 10^{-6}$ CL=90%	DESIG=228
$\Gamma_{75}$	$K^*(892)\eta$	( 1.8 $\pm$ 0.5 ) $\times 10^{-5}$	DESIG=229
$\Gamma_{76}$	$K\phi\phi$	( 2.3 $\pm$ 0.9 ) $\times 10^{-6}$	DESIG=250
$\Gamma_{77}$	$\bar{b} \rightarrow \bar{s}\gamma$	( 3.40 $\pm$ 0.21 ) $\times 10^{-4}$	DESIG=225
$\Gamma_{78}$	$\bar{b} \rightarrow \bar{d}\gamma$	( 9.2 $\pm$ 3.0 ) $\times 10^{-6}$	DESIG=270
$\Gamma_{79}$	$\bar{b} \rightarrow \bar{s}$ gluon	< 6.8 % CL=90%	DESIG=20
$\Gamma_{80}$	$\eta$ anything	( 2.6 $\pm$ 0.5 ) $\times 10^{-4}$	DESIG=47
$\Gamma_{81}$	$\eta'$ anything	( 4.2 $\pm$ 0.9 ) $\times 10^{-4}$	DESIG=48
$\Gamma_{82}$	$K^+$ gluon (charmless)	< 1.87 $\times 10^{-6}$ CL=90%	DESIG=276
$\Gamma_{83}$	$K^0$ gluon (charmless)	( 1.9 $\pm$ 0.7 ) $\times 10^{-4}$	DESIG=277

**Light unflavored meson modes**

$\Gamma_{84}$	$\rho\gamma$	( 1.39 $\pm$ 0.25 ) $\times 10^{-6}$ S=1.2	NODE=S049;CLUMP=P DESIG=230
$\Gamma_{85}$	$\rho/\omega\gamma$	( 1.30 $\pm$ 0.23 ) $\times 10^{-6}$ S=1.2	DESIG=261
$\Gamma_{86}$	$\pi^\pm$ anything	[f,i] ( 358 $\pm$ 7 ) %	DESIG=220
$\Gamma_{87}$	$\pi^0$ anything	( 235 $\pm$ 11 ) %	DESIG=240
$\Gamma_{88}$	$\eta$ anything	( 17.6 $\pm$ 1.6 ) %	DESIG=39
$\Gamma_{89}$	$\rho^0$ anything	( 21 $\pm$ 5 ) %	DESIG=221
$\Gamma_{90}$	$\omega$ anything	< 81 % CL=90%	DESIG=222
$\Gamma_{91}$	$\phi$ anything	( 3.43 $\pm$ 0.12 ) %	DESIG=114
$\Gamma_{92}$	$\phi K^*(892)$	< 2.2 $\times 10^{-5}$ CL=90%	DESIG=46
$\Gamma_{93}$	$\bar{b} \rightarrow \bar{d}$ gluon		DESIG=278
$\Gamma_{94}$	$\pi^+$ gluon (charmless)	( 3.7 $\pm$ 0.8 ) $\times 10^{-4}$	DESIG=279

**Baryon modes**

$\Gamma_{95}$	$\Lambda_c^+ / \bar{\Lambda}_c^-$ anything	( 4.5 $\pm$ 1.2 ) %	NODE=S049;CLUMP=Q DESIG=115
$\Gamma_{96}$	$\Lambda_c^+$ anything	< 1.7 % CL=90%	DESIG=40
$\Gamma_{97}$	$\bar{\Lambda}_c^-$ anything	< 9 % CL=90%	DESIG=41
$\Gamma_{98}$	$\bar{\Lambda}_c^- \ell^+$ anything	< 1.1 $\times 10^{-2}$ CL=90%	DESIG=281
$\Gamma_{99}$	$\bar{\Lambda}_c^- e^+$ anything	< 2.3 $\times 10^{-2}$ CL=90%	DESIG=14
$\Gamma_{100}$	$\bar{\Lambda}_c^- \mu^+$ anything	< - 1.8 $\times 10^{-3}$ CL=90%	DESIG=282
$\Gamma_{101}$	$\bar{\Lambda}_c^- p$ anything	( 2.6 $\pm$ 0.8 ) %	DESIG=16
$\Gamma_{102}$	$\bar{\Lambda}_c^- p e^+ \nu_e$	< 1.0 $\times 10^{-2}$ CL=90%	DESIG=17
$\Gamma_{103}$	$\bar{\Sigma}_c^{--}$ anything	( 4.2 $\pm$ 2.4 ) $\times 10^{-3}$	DESIG=201
$\Gamma_{104}$	$\bar{\Sigma}_c^-$ anything	< 9.6 $\times 10^{-2}$ CL=90%	DESIG=202
$\Gamma_{105}$	$\bar{\Sigma}_c^0$ anything	( 4.6 $\pm$ 2.4 ) $\times 10^{-3}$	DESIG=203
$\Gamma_{106}$	$\bar{\Sigma}_c^0 N$ ( $N = p$ or $n$ )	< 1.5 $\times 10^{-2}$ CL=90%	DESIG=205
$\Gamma_{107}$	$\Xi_c^0$ anything $\times B(\Xi_c^0 \rightarrow \Xi^- \pi^+)$	( 1.93 $\pm$ 0.30 ) $\times 10^{-4}$ S=1.1	DESIG=44
$\Gamma_{108}$	$\Xi_c^+$ anything $\times B(\Xi_c^+ \rightarrow \Xi^- \pi^+ \pi^+)$	( 4.5 $\pm$ 1.3 ) $\times 10^{-4}$	DESIG=45
$\Gamma_{109}$	$p/\bar{p}$ anything	[f] ( 8.0 $\pm$ 0.4 ) %	DESIG=108
$\Gamma_{110}$	$p/\bar{p}$ (direct) anything	[f] ( 5.5 $\pm$ 0.5 ) %	DESIG=132
$\Gamma_{111}$	$\Lambda/\bar{\Lambda}$ anything	[f] ( 4.0 $\pm$ 0.5 ) %	DESIG=109
$\Gamma_{112}$	$\Lambda$ anything		DESIG=42
$\Gamma_{113}$	$\bar{\Lambda}$ anything		DESIG=43
$\Gamma_{114}$	$\Xi^-/\bar{\Xi}^+$ anything	[f] ( 2.7 $\pm$ 0.6 ) $\times 10^{-3}$	DESIG=133
$\Gamma_{115}$	baryons anything	( 6.8 $\pm$ 0.6 ) %	DESIG=134
$\Gamma_{116}$	$p\bar{p}$ anything	( 2.47 $\pm$ 0.23 ) %	DESIG=135
$\Gamma_{117}$	$\Lambda\bar{p}/\bar{\Lambda}p$ anything	[f] ( 2.5 $\pm$ 0.4 ) %	DESIG=136
$\Gamma_{118}$	$\Lambda\bar{\Lambda}$ anything	< 5 $\times 10^{-2}$ CL=90%	DESIG=137

**Lepton Family number (*LF*) violating modes or  
 $\Delta B = 1$  weak neutral current (*B1*) modes**

NODE=S049;CLUMP=R

$\Gamma_{119}$	$s e^+ e^-$	<i>B1</i>	( 4.7 $\pm$ 1.3 ) $\times 10^{-6}$	DESIG=103
$\Gamma_{120}$	$s \mu^+ \mu^-$	<i>B1</i>	( 4.3 $\pm$ 1.2 ) $\times 10^{-6}$	DESIG=104
$\Gamma_{121}$	$s \ell^+ \ell^-$	<i>B1</i>	[b] ( 4.5 $\pm$ 1.0 ) $\times 10^{-6}$	DESIG=59
$\Gamma_{122}$	$\pi \ell^+ \ell^-$	<i>B1</i>	< 6.2 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=266
$\Gamma_{123}$	$K e^+ e^-$	<i>B1</i>	( 4.4 $\pm$ 0.6 ) $\times 10^{-7}$	DESIG=234
$\Gamma_{124}$	$K^*(892) e^+ e^-$	<i>B1</i>	( 1.19 $\pm$ 0.20 ) $\times 10^{-6}$ S=1.2	DESIG=235
$\Gamma_{125}$	$K \mu^+ \mu^-$	<i>B1</i>	( 4.4 $\pm$ 0.4 ) $\times 10^{-7}$	DESIG=236
$\Gamma_{126}$	$K^*(892) \mu^+ \mu^-$	<i>B1</i>	( 1.06 $\pm$ 0.09 ) $\times 10^{-6}$	DESIG=237
$\Gamma_{127}$	$K \ell^+ \ell^-$	<i>B1</i>	( 4.8 $\pm$ 0.4 ) $\times 10^{-7}$	DESIG=238
$\Gamma_{128}$	$K^*(892) \ell^+ \ell^-$	<i>B1</i>	( 1.05 $\pm$ 0.10 ) $\times 10^{-6}$	DESIG=239
$\Gamma_{129}$	$K \nu \bar{\nu}$	<i>B1</i>	< 1.4 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=275
$\Gamma_{130}$	$K^* \nu \bar{\nu}$	<i>B1</i>	< 8 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=269
$\Gamma_{131}$	$s e^\pm \mu^\mp$	<i>LF</i>	[f] < 2.2 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=33
$\Gamma_{132}$	$\pi e^\pm \mu^\mp$	<i>LF</i>	< 9.2 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=243
$\Gamma_{133}$	$\rho e^\pm \mu^\mp$	<i>LF</i>	< 3.2 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=244
$\Gamma_{134}$	$K e^\pm \mu^\mp$	<i>LF</i>	< 3.8 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=241
$\Gamma_{135}$	$K^*(892) e^\pm \mu^\mp$	<i>LF</i>	< 5.1 $\times 10^{-8}$ $\text{CL}=90\%$	DESIG=242

[a] These values are model dependent.

[b] An  $\ell$  indicates an  $e$  or a  $\mu$  mode, not a sum over these modes.

[c] Here "anything" means at least one particle observed.

[d] This is a  $B(B^0 \rightarrow D^{*-} \ell^+ \nu_\ell)$  value.[e]  $D^{**}$  stands for the sum of the  $D(1^1P_1)$ ,  $D(1^3P_0)$ ,  $D(1^3P_1)$ ,  $D(1^3P_2)$ ,  $D(2^1S_0)$ , and  $D(2^1S_1)$  resonances.

[f] The value is for the sum of the charge states or particle/antiparticle states indicated.

[g]  $D^{(*)}\bar{D}^{(*)}$  stands for the sum of  $D^*\bar{D}^*$ ,  $D^*\bar{D}$ ,  $D\bar{D}^*$ , and  $D\bar{D}$ .[h]  $X(3915)$  denotes a near-threshold enhancement in the  $\omega J/\psi$  mass spectrum.

[i] Inclusive branching fractions have a multiplicity definition and can be greater than 100%.

LINKAGE=AAA

LINKAGE=DX

LINKAGE=LX

LINKAGE=B0V

LINKAGE=DSS

LINKAGE=SG

LINKAGE=SGG

LINKAGE=YOJ

LINKAGE=M

### $B^\pm/B^0$ ADMIXTURE BRANCHING RATIOS

#### $\Gamma(e^+ \nu_e \text{anything})/\Gamma_{\text{total}}$

#### $\Gamma_1/\Gamma$

These branching fraction values are model dependent.

"OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at <http://www.slac.stanford.edu/xorg/hfag/>. The averaging/rescaling procedure takes into account correlations between the measurements.

VALUE	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.			

NODE=S049215

NODE=S049S1

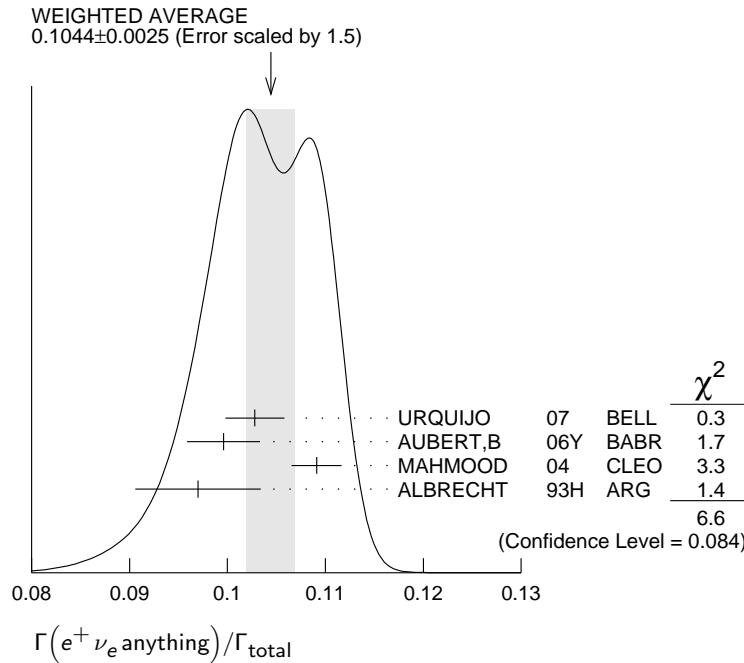
NODE=S049S1

NODE=S049S1

 $\rightarrow$  UNCHECKED  $\leftarrow$ 

<b>0.1072 <math>\pm</math> 0.0013 OUR EVALUATION</b>			
<b>0.1044 <math>\pm</math> 0.0025 OUR AVERAGE</b>	Error includes scale factor of 1.5. See the ideogram below.		
0.1028 $\pm$ 0.0018 $\pm$ 0.0024	1 URQUIJO 07 BELL $e^+ e^- \rightarrow \gamma(4S)$		
0.0996 $\pm$ 0.0019 $\pm$ 0.0032	2 AUBERT,B 06Y BABR $e^+ e^- \rightarrow \gamma(4S)$		
0.1091 $\pm$ 0.0009 $\pm$ 0.0024	3 MAHMOOD 04 CLEO $e^+ e^- \rightarrow \gamma(4S)$		
0.097 $\pm$ 0.005 $\pm$ 0.004	4 ALBRECHT 93H ARG $e^+ e^- \rightarrow \gamma(4S)$		
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>			
0.1085 $\pm$ 0.0021 $\pm$ 0.0036	5 OKABE 05 BELL Repl. by URQUIJO 07		
0.1083 $\pm$ 0.0016 $\pm$ 0.0006	6 AUBERT 04X BABR Repl. by AUBERT,B 06Y		
0.1036 $\pm$ 0.0006 $\pm$ 0.0023	7 AUBERT,B 04A BABR $e^+ e^- \rightarrow \gamma(4S)$		
0.1087 $\pm$ 0.0018 $\pm$ 0.0030	8 AUBERT 03 BABR Repl. by AUBERT 04X		
0.109 $\pm$ 0.0012 $\pm$ 0.0049	9 ABE 02Y BELL Repl. by OKABE 05		
0.1049 $\pm$ 0.0017 $\pm$ 0.0043	10 BARISH 96B CLE2 Repl. by MAHMOOD 04		
0.100 $\pm$ 0.004 $\pm$ 0.003	11 YANAGISAWA 91 CSB2 $e^+ e^- \rightarrow \gamma(4S)$		
0.103 $\pm$ 0.006 $\pm$ 0.002	12 ALBRECHT 90H ARG $e^+ e^- \rightarrow \gamma(4S)$		
0.117 $\pm$ 0.004 $\pm$ 0.010	13 WACHS 89 CBAL Direct e at $\gamma(4S)$		
0.120 $\pm$ 0.007 $\pm$ 0.005	14 CHEN 84 CLEO Direct e at $\gamma(4S)$		
0.132 $\pm$ 0.008 $\pm$ 0.014	15 KLOPFEN... 83B CUSB Direct e at $\gamma(4S)$		

- 1 URQUIJO 07 report a measurement of  $(10.07 \pm 0.18 \pm 0.21)\%$  for the partial branching fraction of  $B \rightarrow e\nu_e X_c$  decay with electron energy above 0.6 GeV. We converted the result to  $B \rightarrow e\nu_e X$  branching fraction.
- 2 The measurements are obtained for charged and neutral  $B$  mesons partial rates of semileptonic decay to electrons with momentum above 0.6 GeV/c in the  $B$  rest frame. The best precision on the ratio is achieved for a momentum threshold of 1.0 GeV:  $B(B^+ \rightarrow e^+\nu_e X) / B(B^0 \rightarrow e^+\nu_e X) = 1.074 \pm 0.041 \pm 0.026$ .
- 3 Uses charge and angular correlations in  $\Upsilon(4S)$  events with a high-momentum lepton and an additional electron.
- 4 ALBRECHT 93H analysis performed using tagged semileptonic decays of the  $B$ . This technique is almost model independent for the lepton branching ratio.
- 5 The measurements are obtained for charged and neutral  $B$  mesons partial rates of semileptonic decay to electrons with momentum above 0.6 GeV/c in the  $B$  rest frame, and their ratio of  $B(B^+ \rightarrow e^+\nu_e X) / B(B^0 \rightarrow e^+\nu_e X) = 1.08 \pm 0.05 \pm 0.02$ .
- 6 The semileptonic branching ratio,  $|V_{cb}|$  and other heavy-quark parameters are determined from a simultaneous fit to moments of the hadronic-mass and lepton-energy distribution.
- 7 Uses the high-momentum lepton tag method and requires the electron energy above 0.6 GeV.
- 8 Uses the high-momentum lepton tag method. They also report  $|V_{cb}| = 0.0423 \pm 0.0007(\text{exp}) \pm 0.0020(\text{theo.})$ .
- 9 Uses the high-momentum lepton tag method. ABE 02Y also reports  $|V_{cb}| = 0.0408 \pm 0.0010(\text{exp}) \pm 0.0025(\text{theo.})$ . The second error is due to uncertainties of theoretical inputs.
- 10 BARISH 96B analysis performed using tagged semileptonic decays of the  $B$ . This technique is almost model independent for the lepton branching ratio.
- 11 YANAGISAWA 91 also measures an average semileptonic branching ratio at the  $\Upsilon(5S)$  of 9.6–10.5% depending on assumptions about the relative production of different  $B$  meson species.
- 12 ALBRECHT 90H uses the model of ALTARELLI 82 to correct over all lepton momenta.  $0.099 \pm 0.006$  is obtained using ISGUR 89B.
- 13 Using data above  $p(e) = 2.4$  GeV, WACHS 89 determine  $\sigma(B \rightarrow e\nu\text{up})/\sigma(B \rightarrow e\nu\text{charm}) < 0.065$  at 90% CL.
- 14 Ratio  $\sigma(b \rightarrow e\nu\text{up})/\sigma(b \rightarrow e\nu\text{charm}) < 0.055$  at CL = 90%.



$\Gamma(\bar{p}e^+\nu_e \text{anything})/\Gamma_{\text{total}}$	$\Gamma_2/\Gamma$
$\text{VALUE}$	$\text{CL\%}$
$<5.9 \times 10^{-4}$	90

1 ADAM 03B CLE2  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.0016 90 ALBRECHT 90H ARG  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Based on  $V-A$  model.

NODE=S049S1;LINKAGE=UR

NODE=S049S1;LINKAGE=AE

NODE=S049S1;LINKAGE=MA

NODE=S049S1;LINKAGE=I

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NODE=S049S1;LINKAGE=AY

NODE=S049S1;LINKAGE=E

NODE=S049S1;LINKAGE=C

NODE=S049S1;LINKAGE=AQ

NODE=S049S1;LINKAGE=DD

NODE=S049S1;LINKAGE=D

NODE=S049S38

NODE=S049S38

NODE=S049S38;LINKAGE=VA

$\Gamma(\mu^+ \nu_\mu \text{anything})/\Gamma_{\text{total}}$ 

These branching fraction values are model dependent.

"OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at <http://www.slac.stanford.edu/xorg/hfag/>. The averaging/rescaling procedure takes into account correlations between the measurements.

VALUE	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.			

**0.1072±0.0013 OUR EVALUATION**

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.100 ± 0.006 ± 0.002	<sup>1</sup> ALBRECHT	90H ARG	$e^+ e^- \rightarrow \gamma(4S)$
0.108 ± 0.006 ± 0.01	CHEN	84 CLEO	Direct $\mu$ at $\gamma(4S)$
0.112 ± 0.009 ± 0.01	LEVMAN	84 CUSB	Direct $\mu$ at $\gamma(4S)$

<sup>1</sup> ALBRECHT 90H uses the model of ALTARELLI 82 to correct over all lepton momenta. 0.097 ± 0.006 is obtained using ISGUR 89B.

 $\Gamma(\ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$  $\Gamma_4/\Gamma$ 

These branching fraction values are model dependent.

"OUR EVALUATION" is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at <http://www.slac.stanford.edu/xorg/hfag/>. The averaging/rescaling procedure takes into account correlations between the measurements.

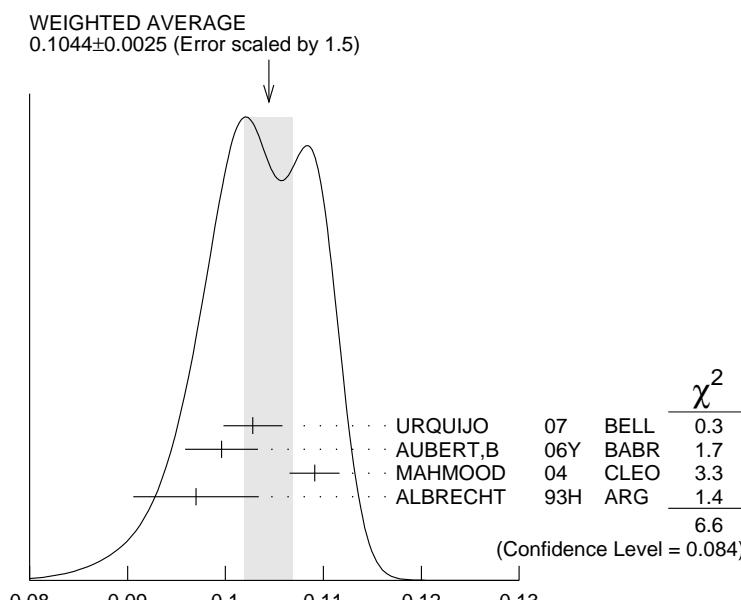
VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.1072±0.0013 OUR EVALUATION</b>			

**0.1044±0.0025 OUR AVERAGE** Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.108 ± 0.002 ± 0.0056	<sup>1</sup> HENDERSON	92 CLEO	$e^+ e^- \rightarrow \gamma(4S)$
------------------------	------------------------	---------	----------------------------------

<sup>1</sup> HENDERSON 92 measurement employs  $e$  and  $\mu$ . The systematic error contains 0.004 in quadrature from model dependence. The authors average a variation of the Isgur, Scora, Grinstein, and Wise model with that of the Altarelli-Cabibbo-Corbò-Maiani-Martinelli model for semileptonic decays to correct the acceptance.

 $\Gamma(\ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$  $\Gamma(D^- \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$ 

$\ell = e$  or  $\mu$ .

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.26±0.07±0.04</b>	<sup>1</sup> FULTON	91 CLEO	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> FULTON 91 uses  $B(D^+ \rightarrow K^- \pi^+ \pi^+) = (9.1 \pm 1.3 \pm 0.4)\%$  as measured by MARK III.

NODE=S049S2

NODE=S049S2

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→ UNCHECKED ←

NODE=S049S2;LINKAGE=AQ

NODE=S049S45

NODE=S049S45

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→ UNCHECKED ←

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NODE=S049S40

NODE=S049S40

NODE=S049S40;LINKAGE=A

$\Gamma(\bar{D}^0 \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$  $\ell = e \text{ or } \mu.$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.67±0.09±0.10</b>	1 FULTON	91 CLEO	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> FULTON 91 uses  $B(D^0 \rightarrow K^- \pi^+) = (4.2 \pm 0.4 \pm 0.4)\%$  as measured by MARK III. $\Gamma(\bar{D} \ell^+ \nu_\ell)/\Gamma(\ell^+ \nu_\ell \text{anything})$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.223±0.006±0.009</b>	1 AUBERT	10 BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side. $\Gamma(\bar{D}\tau^+ \nu_\tau)/\Gamma(\bar{D}\ell^+ \nu_\ell)$ 

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>44 ± 7 OUR AVERAGE</b>	$[(0.86 \pm 0.27) \times 10^{-2} \text{ OUR 2012 AVERAGE}]$		
<b>44.0 ± 5.8±4.2</b>	1,2 LEES	12D BABR	$e^+ e^- \rightarrow \gamma(4S)$

 $\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$ 4.16±11.7±5.2      <sup>1</sup> AUBERT      08N BABR Repl. by LEES 12D<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.<sup>2</sup> Uses  $\tau^+ \rightarrow e^+ \nu_e \bar{\nu}_\tau$  and  $\tau^+ \rightarrow \mu^+ \nu_\mu \bar{\nu}_\tau$  and  $e^+$  or  $\mu^+$  as  $\ell^+$ . Obtained from simultaneous fit to  $B^+$  and  $B^0$  assuming isospin symmetry. $\Gamma(D^{*-} \ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ 

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.67±0.08±0.10</b>	ABDALLAH	04D DLPH	$e^+ e^- \rightarrow Z^0$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
0.6 ± 0.3 ± 0.1	1 BARISH	95 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> BARISH 95 use  $B(D^0 \rightarrow K^- \pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$  and  $B(D^{*+} \rightarrow D^0 \pi^+) = (68.1 \pm 1.0 \pm 1.3)\%$ . $\Gamma(D^{*0} \ell^+ \nu_\ell \text{anything})/\Gamma_{\text{total}}$ 

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
0.6±0.6±0.1	1 BARISH	95 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> BARISH 95 use  $B(D^0 \rightarrow K^- \pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$ ,  $B(D^{*+} \rightarrow D^0 \pi^+) = (68.1 \pm 1.0 \pm 1.3)\%$ ,  $B(D^{*0} \rightarrow D^0 \pi^0) = (63.6 \pm 2.3 \pm 3.3)\%$ . $\Gamma(D^{*+} \tau^+ \nu_\tau)/\Gamma(D^{*+} \ell^+ \nu_\ell)$ 

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>33.2±3.0 OUR AVERAGE</b>	$[(1.62 \pm 0.33) \times 10^{-2} \text{ OUR 2012 AVERAGE}]$		
<b>33.2±2.4±1.8</b>	1 LEES	12D BABR	$e^+ e^- \rightarrow \gamma(4S)$

 $\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$ 29.7±5.6±1.8      <sup>2</sup> AUBERT      08N BABR Repl. by LEES 12D<sup>1</sup> Uses  $\tau^+ \rightarrow e^+ \nu_e \bar{\nu}_\tau$  and  $\tau^+ \rightarrow \mu^+ \nu_\mu \bar{\nu}_\tau$  and  $e^+$  or  $\mu^+$  as  $\ell^+$ . Obtained from simultaneous fit to  $B^+$  and  $B^0$  assuming isospin symmetry. Uses a fully reconstructed  $B$  meson as a tag on the recoil side.<sup>2</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side. The results are normalized to the  $B^+$  decay rate. $\Gamma(\bar{D}^{**} \ell^+ \nu_\ell)/\Gamma_{\text{total}}$ 

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.027±0.005±0.005</b>	63	1 ALBRECHT	93 ARG	$e^+ e^- \rightarrow \gamma(4S)$	

 $\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$ <0.028      95      <sup>2</sup> BARISH      95 CLE2  $e^+ e^- \rightarrow \gamma(4S)$ <sup>1</sup> ALBRECHT 93 assumes the GISW model to correct for unseen modes. Using the BHKT model, the result becomes  $0.023 \pm 0.006 \pm 0.004$ . Assumes  $B(D^{*+} \rightarrow D^0 \pi^+) = 68.1\%$ ,  $B(D^0 \rightarrow K^- \pi^+) = 3.65\%$ ,  $B(D^0 \rightarrow K^- \pi^+ \pi^- \pi^+) = 7.5\%$ . We have taken their average  $e$  and  $\mu$  value.<sup>2</sup> BARISH 95 use  $B(D^0 \rightarrow K^- \pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$ , assume all nonresonant channels are zero, and use GISW model for relative abundances of  $D^{**}$  states. $\Gamma_6/\Gamma_4$ 

NODE=S049S39

NODE=S049S39

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NODE=S049S39;LINKAGE=A

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NODE=S049R37

NODE=S049R37

NEW

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NODE=S049R37;LINKAGE=AU

NODE=S049R96

NODE=S049R96

NODE=S049R96

NODE=S049R96;LINKAGE=A

NODE=S049R96;LINKAGE=C1

$\Gamma(\bar{D}_1(2420)\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}$				$\Gamma_{14}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.0038±0.0013 OUR AVERAGE</b>			Error includes scale factor of 2.4.	
0.0033±0.0006	1 ABAZOV 050 D0	$p\bar{p}$ at 1.96 TeV		
0.0074±0.0016	2 BUSKULIC 97B ALEP	$e^+e^- \rightarrow Z$		
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	3 BUSKULIC 95B ALEP	Repl. by BUSKULIC 97B		
1 Assumes $B(D_1 \rightarrow D^*\pi) = 1$ , $B(D_1 \rightarrow D^*\pi^\pm) = 2/3$ , and $B(b \rightarrow B) = 0.397$ .				NODE=S049R25;LINKAGE=AB
2 BUSKULIC 97B assumes $B(D_1(2420) \rightarrow D^*\pi) = 1$ , $B(D_1(2420) \rightarrow D^*\pi^\pm) = 2/3$ , and $B(b \rightarrow B) = 0.378 \pm 0.022$ .				NODE=S049R25;LINKAGE=B
3 BUSKULIC 95B reports $f_B \times B(B \rightarrow \bar{D}_1(2420)^0\ell^+\nu_\ell\text{anything}) \times B(\bar{D}_1(2420)^0 \rightarrow \bar{D}^*(2010)^-\pi^+) = (2.04 \pm 0.58 \pm 0.34)10^{-3}$ , where $f_B$ is the production fraction for a single $B$ charge state.				NODE=S049R25;LINKAGE=A

$[\Gamma(D\pi\ell^+\nu_\ell\text{anything}) + \Gamma(D^*\pi\ell^+\nu_\ell\text{anything})]/\Gamma_{\text{total}}$				$\Gamma_{15}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.026 ±0.005 OUR AVERAGE</b>			Error includes scale factor of 1.5.	
0.0340±0.0052±0.0032	1 ABREU 00R DLPH	$e^+e^- \rightarrow Z$		
0.0226±0.0029±0.0033	2 BUSKULIC 97B ALEP	$e^+e^- \rightarrow Z$		
1 Assumes no contribution from $B_s$ and $b$ baryons. Further assumes contributions from single pion ( $D\pi$ and $D^*\pi$ ) states only, allowing isospin conservation to relate the relative $\pi^0$ and $\pi^+$ rates.				NODE=S049R34;LINKAGE=B3
2 BUSKULIC 97B assumes $B(b \rightarrow B) = 0.378 \pm 0.022$ and uses isospin invariance by assuming that all observed $D^0\pi^+$ , $D^{*0}\pi^+$ , $D^+\pi^-$ , and $D^{*+}\pi^-$ are from $D^{**}$ states. A correction has been applied to account for the production of $B_s^0$ and $\Lambda_b^0$ .				NODE=S049R34;LINKAGE=B

$\Gamma(D\pi\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}$				$\Gamma_{16}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.0154±0.0061</b>	ABREU 00R DLPH	$e^+e^- \rightarrow Z$		

$\Gamma(D^*\pi\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}$				$\Gamma_{17}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.0186±0.0038</b>	ABREU 00R DLPH	$e^+e^- \rightarrow Z$		

$\Gamma(\bar{D}_2^*(2460)\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}$				$\Gamma_{18}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.0044±0.0016</b>	1 ABAZOV 050 D0	$p\bar{p}$ at 1.96 TeV		
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.0065	95 2 BUSKULIC 97B ALEP	$e^+e^- \rightarrow Z$		
not seen	3 BUSKULIC 95B ALEP	$e^+e^- \rightarrow Z$		
1 Assumes $B(D_2^* \rightarrow D^*\pi^\pm) = 0.30 \pm 0.06$ and $B(b \rightarrow B) = 0.397$ .				
2 A revised number based on BUSKULIC 97B which assumes $B(D_2^*(2460) \rightarrow D^*\pi^\pm) = 0.20$ and $B(b \rightarrow B) = 0.378 \pm 0.022$ .				
3 BUSKULIC 95B reports $f_B \times B(B \rightarrow \bar{D}_2^*(2460)^0\ell^+\nu_\ell\text{anything}) \times B(\bar{D}_2^*(2460)^0 \rightarrow \bar{D}^*(2010)^-\pi^+) \leq 0.81 \times 10^{-3}$ at CL=95%, where $f_B$ is the production fraction for a single $B$ charge state.				

$\Gamma(B \rightarrow \bar{D}_2^*(2460)\ell^+\nu_\ell\text{anything}) \times B(D_2^* \rightarrow D^-\pi^+)$				$\Gamma_{19}/\Gamma$
$\Gamma(B \rightarrow \bar{D}_1(2420)\ell^+\nu_\ell\text{anything}) \times B(\bar{D}_1(2420) \rightarrow D^-\pi^+)$				
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.39±0.09±0.12</b>	ABAZOV 050 D0	$p\bar{p}$ at 1.96 TeV		

$\Gamma(D^*\pi^+\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}$				$\Gamma_{19}/\Gamma$
Includes resonant and nonresonant contributions.				
VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT	
<b>10.0±2.7±2.1</b>	1 BUSKULIC 95B ALEP	$e^+e^- \rightarrow Z$		
1 BUSKULIC 95B reports $f_B \times B(B \rightarrow \bar{D}^*(2010)^-\pi^+\ell^+\nu_\ell\text{anything}) = (3.7 \pm 1.0 \pm 0.7)10^{-3}$ . Above value assumes $f_B = 0.37 \pm 0.03$ .				

$\Gamma(D_s^-\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}$				$\Gamma_{20}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;7 × 10<sup>-3</sup></b>	90 1 ALBRECHT 93E ARG	$e^+e^- \rightarrow \gamma(4S)$		
1 ALBRECHT 93E reports $< 0.012$ from a measurement of $[\Gamma(B \rightarrow D_s^-\ell^+\nu_\ell\text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$ assuming $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ , which we rescale to our best value $B(D_s^+ \rightarrow \phi\pi^+) = 4.5 \times 10^{-2}$ .				

$\Gamma(D_s^- \ell^+ \nu_\ell K^+ \text{anything})/\Gamma_{\text{total}}$   $\Gamma_{21}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5 \times 10^{-3}$	90	1 ALBRECHT	93E ARG	$e^+ e^- \rightarrow \gamma(4S)$
1 ALBRECHT				93E

reports  $< 0.008$  from a measurement of  $[\Gamma(B \rightarrow D_s^- \ell^+ \nu_\ell K^+ \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

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$\Gamma(D_s^- \ell^+ \nu_\ell K^0 \text{anything})/\Gamma_{\text{total}}$   $\Gamma_{22}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<7 \times 10^{-3}$	90	1 ALBRECHT	93E ARG	$e^+ e^- \rightarrow \gamma(4S)$
1 ALBRECHT	93E	reports	<	0.012 from a measurement of $[\Gamma(B \rightarrow D_s^- \ell^+ \nu_\ell K^0 \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$ assuming $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

NODE=S049S77  
NODE=S049S77

NODE=S049S77;LINKAGE=CA

$\Gamma(X_c \ell^+ \nu_\ell)/\Gamma_{\text{total}}$   $\Gamma_{23}/\Gamma$

"OUR EVALUATION" is an average using rescaled values of the data listed below.

The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at <http://www.slac.stanford.edu/xorg/hfag/>. The averaging/rescaling procedure takes into account correlations between the measurements.

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.1051  $\pm$  0.0013 OUR EVALUATION**

**0.1058  $\pm$  0.0015 OUR AVERAGE**

$0.1064 \pm 0.0017 \pm 0.0006$  <sup>1</sup>AUBERT 10A BABR  $e^+ e^- \rightarrow \gamma(4S)$

$0.1044 \pm 0.0019 \pm 0.0022$  <sup>2</sup>URQUIJO 07 BELL  $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.1061 \pm 0.0016 \pm 0.0006$  <sup>3</sup>AUBERT 04X BABR Repl. by AUBERT 10A

1 Obtained from a combined fit to the moments of observed spectra in inclusive  $B \rightarrow X_c \ell^+ \nu_\ell$  decay.

2 Measured the independent  $B^+$  and  $B^0$  partial branching fractions with electron energy above 0.4 GeV.

3 The semileptonic branching ratio,  $|V_{cb}|$  and other heavy-quark parameters are determined from a simultaneous fit to moments of the hadronic-mass and lepton-energy distribution.

NODE=S049S96  
NODE=S049S96

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NODE=S049S96;LINKAGE=AB

NODE=S049S96;LINKAGE=UR

NODE=S049S96;LINKAGE=AU

$\Gamma(X_u \ell^+ \nu_\ell)/\Gamma_{\text{total}}$   $\Gamma_{24}/\Gamma$

"OUR EVALUATION" is an average using rescaled values of the data listed below.

The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at <http://www.slac.stanford.edu/xorg/hfag/>. The averaging/rescaling procedure takes into account correlations between the measurements.

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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**2.12  $\pm$  0.31 OUR EVALUATION**

$[(2.08 \pm 0.30) \times 10^{-3}$  OUR 2012 EVALUATION]

$2.01 \pm 0.15 \pm 0.25$  <sup>1</sup>LEES 12R BABR  $e^+ e^- \rightarrow \gamma(4S)$

$2.27 \pm 0.26 \pm 0.37$  <sup>2</sup>AUBERT 06H BABR  $e^+ e^- \rightarrow \gamma(4S)$

$2.53 \pm 0.24 \pm 0.24$  <sup>3</sup>AUBERT,B 05X BABR  $e^+ e^- \rightarrow \gamma(4S)$

$2.80 \pm 0.52 \pm 0.41$  <sup>4</sup>LIMOSANI 05 BELL  $e^+ e^- \rightarrow \gamma(4S)$

$1.77 \pm 0.29 \pm 0.38$  <sup>5</sup>BORNHEIM 02 CLE2  $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.963 \pm 0.173 \pm 0.159$  <sup>6</sup>URQUIJO 10 BELL  $e^+ e^- \rightarrow \gamma(4S)$

$1.18 \pm 0.09 \pm 0.07$  <sup>7</sup>AUBERT 08AS BABR Repl. by LEES 12R

$2.24 \pm 0.27 \pm 0.47$  <sup>8,9</sup>AUBERT 04I BABR Repl. by AUBERT,B 05X

NODE=S049S95  
NODE=S049S95

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NEW;→ UNCHECKED ←

NODE=S049S95;LINKAGE=LE

1 Measures several partial branching fractions in different phase space regions. The most precise result on the full branching fraction is obtained in the region for lepton momentum in  $B$  rest frame  $p_\ell^* > 1$  GeV/c, where the measured partial branching fraction is  $\Delta B = (1.80 \pm 0.13 \pm 0.15) \times 10^{-3}$ . The acceptance in that region is reported in a private communication by the Authors to be 0.894. The corresponding  $|V_{ub}|$  from the BLNP method is  $(4.28 \pm 0.15 \pm 0.18 \pm 0.19) \times 10^{-3}$ , where the last uncertainty comes from theoretical prediction.

2 Obtained from the partial rate  $\Delta B = (0.572 \pm 0.041 \pm 0.065) \times 10^{-3}$  for the electron momentum interval of 2.0–2.6 GeV/c based on BLNP method.

NODE=S049S95;LINKAGE=AT

<sup>3</sup> Determined from the partial rate  $\Delta B = (4.41 \pm 0.42 \pm 0.42) \times 10^{-4}$  measured for electron energy  $> 2$  GeV and hadronic mass squared  $< 3.5$  GeV $^2$ , and calculated acceptance 0.174 in that region. The  $V_{ub}$  is measured as  $(4.41 \pm 0.30^{+0.65}_{-0.47} \pm 0.28) \times 10^{-3}$ .

<sup>4</sup> Uses electrons in the momentum interval 1.9–2.6 GeV/c in the center-of-mass frame. The  $V_{ub}$  is found to be  $(5.08 \pm 0.47^{+0.49}_{-0.48}) \times 10^{-3}$ .

<sup>5</sup> BORNHEIM 02 uses the observed yield of leptons from semileptonic  $B$  decays in the end-point momentum interval 2.2–2.6 GeV/c with recent CLEO-2 data on  $B \rightarrow X_s \gamma$ . The  $V_{ub}$  is found to be  $(4.08 \pm 0.34 \pm 0.53) \times 10^{-3}$ .

<sup>6</sup> Uses a multivariate analysis method and requires lepton momentum in the  $B$  rest frame,  $p_l^* B > 1.0$  GeV/c.

<sup>7</sup> Measures several partial branching fractions in different phase space regions. The most precise result is obtained in the region for hadronic mass  $M_X < 1.55$  GeV/c $^2$ , and is  $\Delta B = (1.18 \pm 0.09 \pm 0.07) \times 10^{-3}$ . The corresponding  $|V_{ub}|$  from the BLNP method is  $(4.27 \pm 0.16 \pm 0.13 \pm 0.30) \times 10^{-3}$ , where the last uncertainty comes from the theoretical prediction of the partial rate in the given phase-space region.

<sup>8</sup> Used BaBar measurement of Semileptonic branching fraction  $B(B \rightarrow X \ell \nu_\ell) = (10.87 \pm 0.18 \pm 0.30)\%$  to convert the ratio of rates to branching fraction.

<sup>9</sup> The third error includes the systematics and theoretical errors summed in quadrature.

### $\Gamma(X_u \ell^+ \nu_\ell)/\Gamma(\ell^+ \nu_\ell \text{anything})$

### $\Gamma_{24}/\Gamma_4$

$\ell$  denotes e or  $\mu$ , not the sum. These experiments measure this ratio in very limited momentum intervals.

VALUE (units $10^{-2}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>2.06±0.25±0.42</b>			1 AUBERT	04I BABR	$e^+ e^- \rightarrow \gamma(4S)$
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>					
			2 ALBRECHT	94C ARG	$e^+ e^- \rightarrow \gamma(4S)$
			107 BARTEL	93B CLE2	$e^+ e^- \rightarrow \gamma(4S)$
			77 ALBRECHT	91C ARG	$e^+ e^- \rightarrow \gamma(4S)$
			41 ALBRECHT	90 ARG	$e^+ e^- \rightarrow \gamma(4S)$
			76 FULTON	90 CLEO	$e^+ e^- \rightarrow \gamma(4S)$
<4.0	90		7 BEHRENDS	87 CLEO	$e^+ e^- \rightarrow \gamma(4S)$
<4.0	90		CHEN	84 CLEO	Direct e at $\gamma(4S)$
<5.5	90		KLOPFEN...	83B CUSB	Direct e at $\gamma(4S)$

<sup>1</sup> The third error includes the systematics and theoretical errors summed in quadrature.

<sup>2</sup> ALBRECHT 94C find  $\Gamma(b \rightarrow c)/\Gamma(b \rightarrow \text{all}) = 0.99 \pm 0.02 \pm 0.04$ .

<sup>3</sup> BARTEL 93B (CLEO II) measures an excess of  $107 \pm 15 \pm 11$  leptons in the lepton momentum interval 2.3–2.6 GeV/c which is attributed to  $b \rightarrow u \ell \nu_\ell$ . This corresponds to a model-dependent partial branching ratio  $\Delta B_{ub}$  between  $(1.15 \pm 0.16 \pm 0.15) \times 10^{-4}$ , as evaluated using the KS model (KOERNER 88), and  $(1.54 \pm 0.22 \pm 0.20) \times 10^{-4}$  using the ACCMM model (ARTUSO 93). The corresponding values of  $|V_{ub}|/|V_{cb}|$  are  $0.056 \pm 0.006$  and  $0.076 \pm 0.008$ , respectively.

<sup>4</sup> ALBRECHT 91C result supersedes ALBRECHT 90. Two events are fully reconstructed providing evidence for the  $b \rightarrow u$  transition. Using the model of ALTARELLI 82, they obtain  $|V_{ub}/V_{cb}| = 0.11 \pm 0.012$  from 77 leptons in the 2.3–2.6 GeV momentum range.

<sup>5</sup> ALBRECHT 90 observes  $41 \pm 10$  excess e and  $\mu$  (lepton) events in the momentum interval  $p = 2.3$ –2.6 GeV signaling the presence of the  $b \rightarrow u$  transition. The events correspond to a model-dependent measurement of  $|V_{ub}/V_{cb}| = 0.10 \pm 0.01$ .

<sup>6</sup> FULTON 90 observe  $76 \pm 20$  excess e and  $\mu$  (lepton) events in the momentum interval  $p = 2.4$ –2.6 GeV signaling the presence of the  $b \rightarrow u$  transition. The average branching ratio,  $(1.8 \pm 0.4 \pm 0.3) \times 10^{-4}$ , corresponds to a model-dependent measurement of approximately  $|V_{ub}/V_{cb}| = 0.1$  using  $B(b \rightarrow c \ell \nu) = 10.2 \pm 0.2 \pm 0.7\%$ .

<sup>7</sup> The quoted possible limits range from 0.018 to 0.04 for the ratio, depending on which model or momentum range is chosen. We select the most conservative limit they have calculated. This corresponds to a limit on  $|V_{ub}|/|V_{cb}| < 0.20$ . While the endpoint technique employed is more robust than their previous results in CHEN 84, these results do not provide a numerical improvement in the limit.

### $\Gamma(K^+ \ell^+ \nu_\ell \text{anything})/\Gamma(\ell^+ \nu_\ell \text{anything})$

### $\Gamma_{25}/\Gamma_4$

$\ell$  denotes e or  $\mu$ , not the sum.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.58 ± 0.05 OUR AVERAGE</b>	ALBRECHT	94C ARG	$e^+ e^- \rightarrow \gamma(4S)$
0.594 ± 0.021 ± 0.056	1 ALAM	87B CLEO	$e^+ e^- \rightarrow \gamma(4S)$
0.54 ± 0.07 ± 0.06			

<sup>1</sup> ALAM 87B measurement relies on lepton-kaon correlations.

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$\Gamma(K^-\ell^+\nu_\ell\text{anything})/\Gamma(\ell^+\nu_\ell\text{anything})$  $\Gamma_{26}/\Gamma_4$  $\ell$  denotes e or  $\mu$ , not the sum.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.092±0.035 OUR AVERAGE</b>			
0.086±0.011±0.044	ALBRECHT 94C	ARG	$e^+e^- \rightarrow \gamma(4S)$
0.10 ± 0.05 ± 0.02	1 ALAM 87B	CLEO	$e^+e^- \rightarrow \gamma(4S)$

1 ALAM 87B measurement relies on lepton-kaon correlations.

 $\Gamma(K^0/\bar{K}^0\ell^+\nu_\ell\text{anything})/\Gamma(\ell^+\nu_\ell\text{anything})$  $\Gamma_{27}/\Gamma_4$  $\ell$  denotes e or  $\mu$ , not the sum. Sum over  $K^0$  and  $\bar{K}^0$  states.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.42 ± 0.05 OUR AVERAGE</b>			
0.452±0.038±0.056	1 ALBRECHT 94C	ARG	$e^+e^- \rightarrow \gamma(4S)$
0.39 ± 0.06 ± 0.04	2 ALAM 87B	CLEO	$e^+e^- \rightarrow \gamma(4S)$

1 ALBRECHT 94C assume a  $K^0/\bar{K}^0$  multiplicity twice that of  $K_S^0$ .

2 ALAM 87B measurement relies on lepton-kaon correlations.

 $\langle n_c \rangle$  $\Gamma_{27}/\Gamma_4$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.10±0.05</b>			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.98±0.16±0.12	2 ALAM 87B	CLEO	$e^+e^- \rightarrow \gamma(4S)$

1 GIBBONS 97B from charm counting using  $B(D_s^+ \rightarrow \phi\pi) = 0.036 \pm 0.009$  and  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = 0.044 \pm 0.006$ .2 From the difference between  $K^-$  and  $K^+$  widths. ALAM 87B measurement relies on lepton-kaon correlations. It does not consider the possibility of  $B\bar{B}$  mixing. We have thus removed it from the average. $\Gamma(D^\pm\text{anything})/\Gamma_{\text{total}}$  $\Gamma_{28}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.237±0.013 OUR AVERAGE</b>				
0.237±0.013±0.005	1 GIBBONS 97B	CLE2	$e^+e^- \rightarrow \gamma(4S)$	
0.25 ± 0.04 ± 0.01	2 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \gamma(4S)$	
0.229±0.053±0.005	3 ALBRECHT 91H	ARG	$e^+e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.208±0.049±0.004 20k 4 BORTOLETTO87 CLEO Sup. by BORTOLETTO 92

1 GIBBONS 97B reports  $[\Gamma(B \rightarrow D^\pm\text{anything})/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K^-2\pi^+)] = 0.0216 \pm 0.0008 \pm 0.00082$  which we divide by our best value  $B(D^+ \rightarrow K^-2\pi^+) = (9.13 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.2 BORTOLETTO 92 reports  $[\Gamma(B \rightarrow D^\pm\text{anything})/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K^-2\pi^+)] = 0.0226 \pm 0.0030 \pm 0.0018$  which we divide by our best value  $B(D^+ \rightarrow K^-2\pi^+) = (9.13 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.3 ALBRECHT 91H reports  $[\Gamma(B \rightarrow D^\pm\text{anything})/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K^-2\pi^+)] = 0.0209 \pm 0.0027 \pm 0.0040$  which we divide by our best value  $B(D^+ \rightarrow K^-2\pi^+) = (9.13 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.4 BORTOLETTO 87 reports  $[\Gamma(B \rightarrow D^\pm\text{anything})/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K^-2\pi^+)] = 0.019 \pm 0.004 \pm 0.002$  which we divide by our best value  $B(D^+ \rightarrow K^-2\pi^+) = (9.13 \pm 0.19) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. $\Gamma(D^0/\bar{D}^0\text{anything})/\Gamma_{\text{total}}$  $\Gamma_{29}/\Gamma$ 

0.627±0.029 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.627±0.029 OUR AVERAGE</b> Error includes scale factor of 1.3. See the ideogram below.				
0.647±0.025 <sup>+0.007</sup> <sub>-0.008</sub>	1 GIBBONS 97B	CLE2	$e^+e^- \rightarrow \gamma(4S)$	
0.60 ± 0.05 ± 0.01	2 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \gamma(4S)$	
0.50 ± 0.08 ± 0.01	3 ALBRECHT 91H	ARG	$e^+e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.54 ± 0.07 ± 0.01	21k 4 BORTOLETTO87	CLEO	$e^+e^- \rightarrow \gamma(4S)$	
0.62 ± 0.19 ± 0.01	5 GREEN 83	CLEO	Repl. by BORTOLETTO 87	

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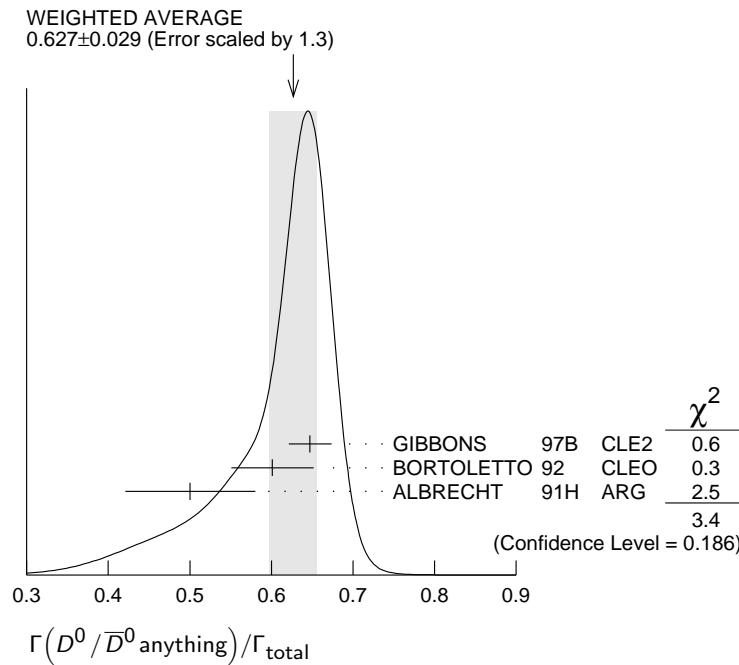
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- <sup>1</sup> GIBBONS 97B reports  $[\Gamma(B \rightarrow D^0/\bar{D}^0 \text{ anything})/\Gamma_{\text{total}}] \times [B(D^0 \rightarrow K^-\pi^+)] = 0.0251 \pm 0.0006 \pm 0.00075$  which we divide by our best value  $B(D^0 \rightarrow K^-\pi^+) = (3.88 \pm 0.05) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>2</sup> BORTOLETTO 92 reports  $[\Gamma(B \rightarrow D^0/\bar{D}^0 \text{ anything})/\Gamma_{\text{total}}] \times [B(D^0 \rightarrow K^-\pi^+)] = 0.0233 \pm 0.0012 \pm 0.0014$  which we divide by our best value  $B(D^0 \rightarrow K^-\pi^+) = (3.88 \pm 0.05) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>3</sup> ALBRECHT 91H reports  $[\Gamma(B \rightarrow D^0/\bar{D}^0 \text{ anything})/\Gamma_{\text{total}}] \times [B(D^0 \rightarrow K^-\pi^+)] = 0.0194 \pm 0.0015 \pm 0.0025$  which we divide by our best value  $B(D^0 \rightarrow K^-\pi^+) = (3.88 \pm 0.05) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>4</sup> BORTOLETTO 87 reports  $[\Gamma(B \rightarrow D^0/\bar{D}^0 \text{ anything})/\Gamma_{\text{total}}] \times [B(D^0 \rightarrow K^-\pi^+)] = 0.0210 \pm 0.0015 \pm 0.0021$  which we divide by our best value  $B(D^0 \rightarrow K^-\pi^+) = (3.88 \pm 0.05) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>5</sup> GREEN 83 reports  $[\Gamma(B \rightarrow D^0/\bar{D}^0 \text{ anything})/\Gamma_{\text{total}}] \times [B(D^0 \rightarrow K^-\pi^+)] = 0.024 \pm 0.006 \pm 0.004$  which we divide by our best value  $B(D^0 \rightarrow K^-\pi^+) = (3.88 \pm 0.05) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.



$\Gamma(D^*(2010)^{\pm} \text{ anything})/\Gamma_{\text{total}}$	$\Gamma_{30}/\Gamma$
<u>VALUE</u>	<u>EVTS</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>
<b>0.225 ± 0.015 OUR AVERAGE</b>	
0.247 ± 0.019 ± 0.01	1 GIBBONS 97B CLE2 $e^+e^- \rightarrow \gamma(4S)$
0.205 ± 0.019 ± 0.007	2 ALBRECHT 96D ARG $e^+e^- \rightarrow \gamma(4S)$
0.230 ± 0.028 ± 0.009	3 BORTOLETTO92 CLEO $e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •	
0.283 ± 0.053 ± 0.002	4 ALBRECHT 91H ARG Sup. by ALBRECHT 96D
0.22 ± 0.04 ± 0.07	5200 5 BORTOLETTO87 CLEO $e^+e^- \rightarrow \gamma(4S)$
0.27 ± 0.06 ± 0.08	510 6 CSORNA 85 CLEO Repl. by BORTOLETTO 87

<sup>1</sup> GIBBONS 97B reports  $B(B \rightarrow D^*(2010)^+ \text{ anything}) = 0.239 \pm 0.015 \pm 0.014 \pm 0.009$  using CLEO measured  $D$  and  $D^*$  branching fractions. We rescale to our PDG 96 values of  $D$  and  $D^*$  branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> ALBRECHT 96D reports  $B(B \rightarrow D^*(2010)^+ \text{ anything}) = 0.196 \pm 0.019$  using CLEO measured  $B(D^*(2010)^+ \rightarrow D^0\pi^+) = 0.681 \pm 0.01 \pm 0.013$ ,  $B(D^0 \rightarrow K^-\pi^+) = 0.0401 \pm 0.0014$ ,  $B(D^0 \rightarrow K^-\pi^+\pi^-) = 0.081 \pm 0.005$ . We rescale to our PDG 96 values of  $D$  and  $D^*$  branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> BORTOLETTO 92 reports  $B(B \rightarrow D^*(2010)^+ \text{ anything}) = 0.25 \pm 0.03 \pm 0.04$  using MARK II  $B(D^*(2010)^+ \rightarrow D^0\pi^+) = 0.57 \pm 0.06$  and  $B(D^0 \rightarrow K^-\pi^+) = 0.042 \pm$

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NODE=S049S12;LINKAGE=F

NODE=S049S12;LINKAGE=G

0.008. We rescale to our PDG 96 values of  $D$  and  $D^*$  branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> ALBRECHT 91H reports  $0.348 \pm 0.060 \pm 0.035$  from a measurement of  $[\Gamma(B \rightarrow D^*(2010)^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.55 \pm 0.04$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Uses the PDG 90  $B(D^0 \rightarrow K^- \pi^+) = 0.0371 \pm 0.0025$ .

<sup>5</sup> BORTOLETTO 87 uses old MARK III (BALTRUSAITIS 86E) branching ratios  $B(D^0 \rightarrow K^- \pi^+) = 0.056 \pm 0.004 \pm 0.003$  and also assumes  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.60^{+0.08}_{-0.15}$ . The product branching ratio for  $B(B \rightarrow D^*(2010)^+) B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  is  $0.13 \pm 0.02 \pm 0.012$ . Superseded by BORTOLETTO 92.

<sup>6</sup>  $V-A$  momentum spectrum used to extrapolate below  $p = 1$  GeV. We correct the value assuming  $B(D^0 \rightarrow K^- \pi^+) = 0.042 \pm 0.006$  and  $B(D^{*+} \rightarrow D^0 \pi^+) = 0.6^{+0.08}_{-0.15}$ . The product branching fraction is  $B(B \rightarrow D^{*+} X) \cdot B(D^{*+} \rightarrow \pi^+ D^0) \cdot B(D^0 \rightarrow K^- \pi^+) = (68 \pm 15 \pm 9) \times 10^{-4}$ .

$\Gamma(D^*(2007)^0 \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{31}/\Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.260 \pm 0.023 \pm 0.015</math></b>	<sup>1</sup> GIBBONS 97B	CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> GIBBONS 97B reports  $B(B \rightarrow D^*(2007)^0 \text{anything}) = 0.247 \pm 0.012 \pm 0.018 \pm 0.018$  using CLEO measured  $D$  and  $D^*$  branching fractions. We rescale to our PDG 96 values of  $D$  and  $D^*$  branching ratios. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{\pm} \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{32}/\Gamma$			
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.083 \pm 0.008 \text{ OUR AVERAGE}</math></b>				
0.089 $\pm 0.010 \pm 0.008$		<sup>1</sup> ARTUSO 05B	CLE2	$e^+ e^- \rightarrow \gamma(5S)$
0.087 $\pm 0.005 \pm 0.008$		<sup>2</sup> AUBERT 02G	BABR	$e^+ e^- \rightarrow \gamma(4S)$
0.065 $\pm 0.011 \pm 0.006$		<sup>3</sup> ALBRECHT 92G	ARG	$e^+ e^- \rightarrow \gamma(4S)$
0.068 $\pm 0.010 \pm 0.006$	257	<sup>4</sup> BORTOLETTO90	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
0.085 $\pm 0.022 \pm 0.008$		<sup>5</sup> HAAS 86	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>				
0.094 $\pm 0.007 \pm 0.008$		<sup>6</sup> GIBAUT 96	CLE2	Repl. by ARTUSO 05B
0.094 $\pm 0.024 \pm 0.008$		<sup>7</sup> ALBRECHT 87H	ARG	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> ARTUSO 05B reports  $0.0905 \pm 0.0025 \pm 0.0140$  from a measurement of  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = (4.4 \pm 0.5) \times 10^{-2}$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AUBERT 02G reports  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = 0.00393 \pm 0.00007 \pm 0.00021$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> ALBRECHT 92G reports  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = 0.00292 \pm 0.00039 \pm 0.00031$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> BORTOLETTO 90 reports  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = 0.00306 \pm 0.00047$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>5</sup> HAAS 86 reports  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = 0.0038 \pm 0.0010$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. 64  $\pm$  22% decays are 2-body.

<sup>6</sup> GIBAUT 96 reports  $0.1211 \pm 0.0039 \pm 0.0088$  from a measurement of  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.035$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

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<sup>7</sup> ALBRECHT 87H reports  $[\Gamma(B \rightarrow D_s^{\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)] = 0.0042 \pm 0.0009 \pm 0.0006$  which we divide by our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  $46 \pm 16\%$  of  $B \rightarrow D_s X$  decays are 2-body. Superseded by ALBRECHT 92G.

$\Gamma(D_s^{*\pm} \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{33}/\Gamma$	
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.063±0.009±0.006</b>	1 AUBERT 02G BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> AUBERT 02G reports  $[\Gamma(B \rightarrow D_s^{*\pm} \text{anything})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)] = 0.00284 \pm 0.00029 \pm 0.00025$  which we divide by our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^{*\pm} \bar{D}^{(*)})/\Gamma(D_s^{*\pm} \text{anything})$	$\Gamma_{34}/\Gamma_{33}$	
Sum over modes		
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.533±0.037±0.037</b>	AUBERT 02G BABR	$e^+ e^- \rightarrow \gamma(4S)$

$\Gamma(\bar{D}D_{s0}(2317))/\Gamma_{\text{total}}$	$\Gamma_{35}/\Gamma$	
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>seen</b>	1 KROKOVNY 03B BELL	$e^+ e^- \rightarrow \gamma(4S)$
1 The product branching ratio for $B(B \rightarrow \bar{D}D_{s0}(2317)^+) \times B(D_{s0}(2317)^+ \rightarrow D_s \pi^0)$ is measured to be $(8.5^{+2.1}_{-1.9} \pm 2.6) \times 10^{-4}$ .		

$\Gamma(\bar{D}D_{sJ}(2457))/\Gamma_{\text{total}}$	$\Gamma_{36}/\Gamma$	
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>seen</b>	1 KROKOVNY 03B BELL	$e^+ e^- \rightarrow \gamma(4S)$
1 The product branching ratio for $B(B \rightarrow \bar{D}D_{sJ}(2457)^+) \times B(D_{sJ}(2457)^+ \rightarrow D_s^{*+} \pi^0, D_s^+ \gamma)$ are measured to be $(17.8^{+4.5}_{-3.9} \pm 5.3) \times 10^{-4}$ and $(6.7^{+1.3}_{-1.2} \pm 2.0) \times 10^{-4}$ , respectively.		

$[\Gamma(D^{(*)}\bar{D}^{(*)}K^0) + \Gamma(D^{(*)}\bar{D}^{(*)}K^\pm)]/\Gamma_{\text{total}}$	$\Gamma_{37}/\Gamma$	
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.071<sup>+0.025</sup><sub>-0.015</sub><sup>+0.010</sup><sub>-0.009</sub></b>	1 BARATE 98Q ALEP	$e^+ e^- \rightarrow Z$

<sup>1</sup> The systematic error includes the uncertainties due to the charm branching ratios.

$\Gamma(b \rightarrow c\bar{c}s)/\Gamma_{\text{total}}$	$\Gamma_{38}/\Gamma$	
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.219±0.037</b>	1 COAN 98 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> COAN 98 uses  $D$ - $\ell$  correlation.

$\Gamma(D_s^{(*)}\bar{D}^{(*)})/\Gamma(D_s^{\pm} \text{anything})$	$\Gamma_{39}/\Gamma_{32}$	
Sum over modes.		
<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.469±0.017 OUR AVERAGE</b>		

0.464 $\pm 0.013 \pm 0.015$	AUBERT 02G BABR	$e^+ e^- \rightarrow \gamma(4S)$
0.56 $^{+0.21}_{-0.15} \pm 0.09_{-0.08}$	1 BARATE 98Q ALEP	$e^+ e^- \rightarrow Z$
0.457 $\pm 0.019 \pm 0.037$	GIBAUT 96 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
0.58 $\pm 0.07 \pm 0.09$	ALBRECHT 92G ARG	$e^+ e^- \rightarrow \gamma(4S)$
0.56 $\pm 0.10$	BORTOLETTO90 CLEO	$e^+ e^- \rightarrow \gamma(4S)$
1 BARATE 98Q measures $B(B \rightarrow D_s^{(*)}\bar{D}^{(*)}) = 0.056^{+0.021+0.009+0.019}_{-0.015-0.008-0.011}$ , where the third error results from the uncertainty on the different $D$ branching ratios and is dominated by the uncertainty on $B(D_s^+ \rightarrow \phi\pi^+)$ . We divide $B(B \rightarrow D_s^{(*)}\bar{D}^{(*)})$ by our best value of $B(B \rightarrow D_s \text{anything}) = 0.1 \pm 0.025$ .		

$\Gamma(D^* D^*(2010)^{\pm})/\Gamma_{\text{total}}$	$\Gamma_{40}/\Gamma$		
<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;5.9 × 10<sup>-3</sup></b>	90 BARATE 98Q ALEP	$e^+ e^- \rightarrow Z$	

$[\Gamma(D D^*(2010)^{\pm}) + \Gamma(D^* D^{\pm})]/\Gamma_{\text{total}}$	$\Gamma_{41}/\Gamma$		
<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;5.5 × 10<sup>-3</sup></b>	90 BARATE 98Q ALEP	$e^+ e^- \rightarrow Z$	

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NODE=S049R4

NODE=S049R5  
NODE=S049R5

$\Gamma(DD^\pm)/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{42}/\Gamma$
$<3.1 \times 10^{-3}$	90	BARATE	98Q ALEP	$e^+ e^- \rightarrow Z$	

 $\Gamma(D_s^{(*)}\pm \bar{D}^{(*)} X(n\pi^\pm))/\Gamma_{\text{total}}$ 

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{43}/\Gamma$
$0.094^{+0.040}_{-0.031} {}^{+0.034}_{-0.024}$	1 BARATE	98Q ALEP	$e^+ e^- \rightarrow Z$	

<sup>1</sup> The systematic error includes the uncertainties due to the charm branching ratios.

 $\Gamma(D^*(2010)\gamma)/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{44}/\Gamma$
$<1.1 \times 10^{-3}$	90	1 LESIAK	92 CBAL	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> LESIAK 92 set a limit on the inclusive process  $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$  at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about  $s$ -quark hadronization.

 $\Gamma(D_s^+\pi^-, D_s^{*+}\pi^-, D_s^+\rho^-, D_s^{*+}\rho^-, D_s^+\pi^0, D_s^{*+}\pi^0, D_s^+\eta, D_s^{*+}\eta, D_s^+\rho^0, D_s^{*+}\rho^0, D_s^+\omega, D_s^{*+}\omega)/\Gamma_{\text{total}}$ 

Sum over modes.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{45}/\Gamma$
$<4 \times 10^{-4}$	90	1 ALEXANDER	93B CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> ALEXANDER 93B reports  $< 4.8 \times 10^{-4}$  from a measurement of  $[\Gamma(B \rightarrow D_s^+\pi^-, D_s^{*+}\pi^-, D_s^+\rho^-, D_s^{*+}\rho^-, D_s^+\pi^0, D_s^{*+}\pi^0, D_s^+\eta, D_s^{*+}\eta, D_s^+\rho^0, D_s^{*+}\rho^0, D_s^+\omega, D_s^{*+}\omega)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 4.5 \times 10^{-2}$ . This branching ratio limit provides a model-dependent upper limit  $|V_{ub}|/|V_{cb}| < 0.16$  at CL=90%.

 $\Gamma(D_{s1}(2536)^+ \text{anything})/\Gamma_{\text{total}}$ 

$D_{s1}(2536)^+$  is the narrow  $P$ -wave  $D_s^+$  meson with  $J^P = 1^+$ .

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{46}/\Gamma$
$<0.0095$	90	1 BISHAI	98 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Assuming factorization, the decay constant  $f_{D_{s1}^+}$  is at least a factor of 2.5 times smaller than  $f_{D_s^+}$ .

 $\Gamma(J/\psi(1S)\text{anything})/\Gamma_{\text{total}}$ 

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{47}/\Gamma$
<b><math>1.094 \pm 0.032</math> OUR AVERAGE</b>				Error includes scale factor of 1.1.	

1.057 $\pm 0.012 \pm 0.040$	1 AUBERT	03F BABR	$e^+ e^- \rightarrow \gamma(4S)$
1.121 $\pm 0.013 \pm 0.042$	ANDERSON	02 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
1.30 $\pm 0.45 \pm 0.01$	27	2 MASCHMANN 90	$e^+ e^- \rightarrow \gamma(4S)$
1.24 $\pm 0.27 \pm 0.01$	120	3 ALBRECHT	87D ARG $e^+ e^- \rightarrow \gamma(4S)$
1.36 $\pm 0.24 \pm 0.01$	52	4 ALAM	86 CLEO $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.13 $\pm 0.06 \pm 0.01$	1489	5 BAILEST	95B CLE2	$e^+ e^- \rightarrow \gamma(4S)$
1.4 $\pm 0.6$ $-0.5$	7	6 ALBRECHT	85H ARG	$e^+ e^- \rightarrow \gamma(4S)$
1.1 $\pm 0.21 \pm 0.23$	46	7 HAAS	85 CLEO	Repl. by ALAM 86

<sup>1</sup> AUBERT 03F also reports the momentum distribution and helicity of  $J/\psi \rightarrow \ell^+ \ell^-$  in the  $\gamma(4S)$  center-of-mass frame.

<sup>2</sup> MASCHMANN 90 reports  $(1.12 \pm 0.33 \pm 0.25) \times 10^{-2}$  from a measurement of  $[\Gamma(B \rightarrow J/\psi(1S)\text{anything})/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+ e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+ e^-) = (5.94 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> ALBRECHT 87D reports  $(1.07 \pm 0.16 \pm 0.22) \times 10^{-2}$  from a measurement of  $[\Gamma(B \rightarrow J/\psi(1S)\text{anything})/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+ e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+ e^-) = (5.94 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. ALBRECHT 87D find the branching ratio for  $J/\psi$  not from  $\psi(2S)$  to be  $0.0081 \pm 0.0023$ .

<sup>4</sup> ALAM 86 reports  $(1.09 \pm 0.16 \pm 0.21) \times 10^{-2}$  from a measurement of  $[\Gamma(B \rightarrow J/\psi(1S)\text{anything})/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \mu^+ \mu^-)]$  assuming  $B(J/\psi(1S) \rightarrow$

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NODE=S049R6

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NODE=S049R3

NODE=S049R3;LINKAGE=A

NODE=S049S54

NODE=S049S54

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NODE=S049S7;LINKAGE=BC

NODE=S049S7;LINKAGE=B

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$\mu^+ \mu^-) = 0.074 \pm 0.012$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = (5.93 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

5 BAILEST 95B reports  $(1.12 \pm 0.04 \pm 0.06) \times 10^{-2}$  from a measurement of  $[\Gamma(B \rightarrow J/\psi(1S)\text{anything})/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+ e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0599 \pm 0.0025$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+ e^-) = (5.94 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. They measure  $J/\psi(1S) \rightarrow e^+ e^-$  and  $\mu^+ \mu^-$  and use PDG 1994 values for the branching fractions. The rescaling is the same for either mode so we use  $e^+ e^-$ .

6 Statistical and systematic errors were added in quadrature. ALBRECHT 85H also report a CL = 90% limit of 0.007 for  $B \rightarrow J/\psi(1S) + X$  where  $m_X < 1 \text{ GeV}$ .

7 Dimuon and dielectron events used.

### $\Gamma(J/\psi(1S)(\text{direct anything})/\Gamma_{\text{total}}$

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{48}/\Gamma$
<b>0.0078 ± 0.0004 OUR AVERAGE</b>			Error includes scale factor of 1.1.	
0.00740 ± 0.00023 ± 0.00043	1 AUBERT	03F BABR	$e^+ e^- \rightarrow \gamma(4S)$	
0.00813 ± 0.00017 ± 0.00037	2 ANDERSON	02 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0080 ± 0.0008	3 BAILEST	95B CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

1 AUBERT 03F also reports the helicity of  $J/\psi \rightarrow \ell^+ \ell^-$  produced directly in  $B$  decay.

2 Also reports the measurement of  $J/\psi \rightarrow \ell^+ \ell^-$  polarization produced directly from  $B$  decay.

3 BAILEST 95B assume PDG 1994 values for sub mode branching ratios.  $J/\psi(1S)$  mesons are reconstructed in  $J/\psi(1S) \rightarrow e^+ e^-$  and  $J/\psi(1S) \rightarrow \mu^+ \mu^-$ . The  $B \rightarrow J/\psi(1S)X$  branching ratio contains  $J/\psi(1S)$  mesons directly from  $B$  decays and also from feeddown through  $\psi(2S) \rightarrow J/\psi(1S)$ ,  $\chi_{c1}(1P) \rightarrow J/\psi(1S)$ , or  $\chi_{c2}(1P) \rightarrow J/\psi(1S)$ . Using the measured inclusive rates, BAILEST 95B corrects for the feeddown and finds the  $B \rightarrow J/\psi(1S)(\text{direct}) X$  branching ratio.

### $\Gamma(\psi(2S)\text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{49}/\Gamma$
<b>0.00307 ± 0.00021 OUR AVERAGE</b>					
0.00297 ± 0.00020 ± 0.00020		AUBERT	03F BABR	$e^+ e^- \rightarrow \gamma(4S)$	
0.00316 ± 0.00014 ± 0.00028		1 ANDERSON	02 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	
0.0046 ± 0.0017 ± 0.0011	8	ALBRECHT	87D ARG	$e^+ e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0034 ± 0.0004 ± 0.0003	240	2 BAILEST	95B CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

1 Also reports the measurement of  $\psi(2S) \rightarrow \ell^+ \ell^-$  polarization produced directly from  $B$  decay.

2 BAILEST 95B assume PDG 1994 values for sub mode branching ratios. They find  $B(B \rightarrow \psi(2S)X, \psi(2S) \rightarrow \ell^+ \ell^-) = 0.30 \pm 0.05 \pm 0.04$  and  $B(B \rightarrow \psi(2S)X, \psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = 0.37 \pm 0.05 \pm 0.05$ . Weighted average is quoted for  $B(B \rightarrow \psi(2S)X)$ .

### $\Gamma(\chi_{c1}(1P)\text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{50}/\Gamma$
<b>0.00386 ± 0.00027 OUR AVERAGE</b>					
0.00367 ± 0.00035 ± 0.00044		AUBERT	03F BABR	$e^+ e^- \rightarrow \gamma(4S)$	
0.00363 ± 0.00022 ± 0.00034		1 ABE	02L BELL	$e^+ e^- \rightarrow \gamma(4S)$	
0.00435 ± 0.00029 ± 0.00040		ANDERSON	02 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00325 ± 0.00035 ± 0.00014		2 CHEN	01 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	
0.0040 ± 0.0006 ± 0.0004	112	3 BAILEST	95B CLE2	Repl. by CHEN 01	
0.0105 ± 0.0035 ± 0.0025		4 ALBRECHT	92E ARG	$e^+ e^- \rightarrow \gamma(4S)$	

1 ABE 02L uses PDG 01 values for  $B(J/\psi(1S) \rightarrow \ell^+ \ell^-)$  and  $B(\chi_{c1,c2} \rightarrow J/\psi(1S)\gamma)$ .

2 CHEN 01 reports  $0.00414 \pm 0.00031 \pm 0.00040$  from a measurement of  $[\Gamma(B \rightarrow \chi_{c1}(1P)\text{anything})/\Gamma_{\text{total}}] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.8 \pm 1.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

3 BAILEST 95B assume  $B(\chi_{c1}(1P) \rightarrow J/\psi(1S)\gamma) = (27.3 \pm 1.6) \times 10^{-2}$ , the PDG 1994 value. Fit to  $\psi$ -photon invariant mass distribution allows for a  $\chi_{c1}(1P)$  and a  $\chi_{c2}(1P)$  component.

4 ALBRECHT 92E assumes no  $\chi_{c2}(1P)$  production.

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$\Gamma(\chi_{c1}(1P)(\text{direct}) \text{ anything})/\Gamma_{\text{total}}$ 

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{51}/\Gamma$
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**0.00320 ± 0.00025 OUR AVERAGE**

[0.00322 ± 0.00025 OUR 2012 AVERAGE]

0.00341 ± 0.00035 ± 0.00042	AUBERT	03F BABR	$e^+ e^- \rightarrow \gamma(4S)$	
0.00332 ± 0.00022 ± 0.00034	<sup>1</sup> ABE	02L BELL	$e^+ e^- \rightarrow \gamma(4S)$	
0.0030 ± 0.0004 ± 0.0001	<sup>2</sup> CHEN	01 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0037 ± 0.0007	<sup>3</sup> BALEST	95B CLE2	Repl. by CHEN 01	
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<sup>1</sup> ABE 02L uses PDG 01 values for  $B(J/\psi(1S) \rightarrow \ell^+ \ell^-)$  and  $B(\chi_{c1}, c_2 \rightarrow J/\psi(1S)\gamma)$ .

<sup>2</sup> CHEN 01 reports  $0.00383 \pm 0.00031 \pm 0.00040$  from a measurement of  $[\Gamma(B \rightarrow \chi_{c1}(1P)(\text{direct}) \text{ anything})/\Gamma_{\text{total}}] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.8 \pm 1.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>3</sup> BALEST 95B assume PDG 1994 values.  $J/\psi(1S)$  mesons are reconstructed in the  $e^+ e^-$  and  $\mu^+ \mu^-$  modes. The  $B \rightarrow \chi_{c1}(1P)X$  branching ratio contains  $\chi_{c1}(1P)$  mesons directly from  $B$  decays and also from feeddown through  $\psi(2S) \rightarrow \chi_{c1}(1P)\gamma$ . Using the measured inclusive rates, BALEST 95B corrects for the feeddown and finds the  $B \rightarrow \chi_{c1}(1P)(\text{direct}) X$  branching ratio.

 $\Gamma(\chi_{c2}(1P)\text{anything})/\Gamma_{\text{total}}$ 

VALUE (units $10^{-4}$ )	CL %	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{52}/\Gamma$
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**13 ± 4 OUR AVERAGE** Error includes scale factor of 1.9. See the ideogram below.[(13 ± 4) × 10<sup>-4</sup> OUR 2012 AVERAGE Scale factor = 1.9]

21.0 ± 4.5 ± 3.1	AUBERT	03F BABR	$e^+ e^- \rightarrow \gamma(4S)$	
18.0 <sup>+2.3</sup> <sub>-2.8</sub> ± 2.6	<sup>1</sup> ABE	02L BELL	$e^+ e^- \rightarrow \gamma(4S)$	
6.7 ± 3.4 ± 0.3	<sup>2</sup> CHEN	01 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

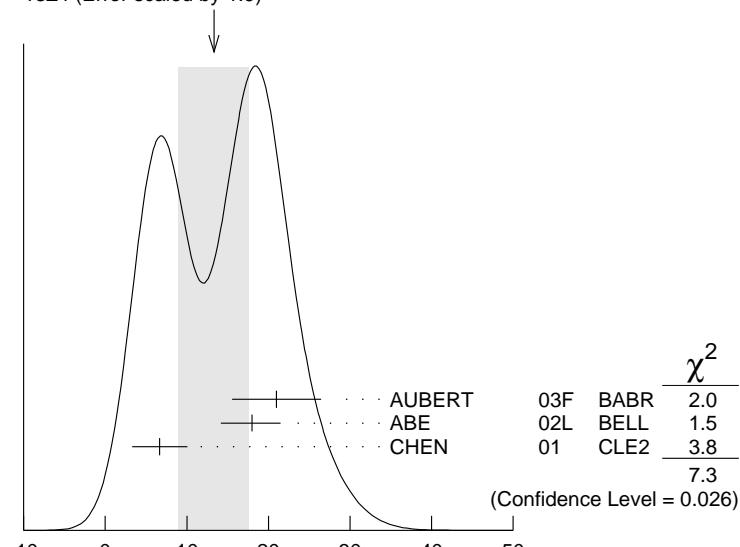
<38	90	35	<sup>3</sup> BALEST	95B CLE2	Repl. by CHEN 01	
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<sup>1</sup> ABE 02L uses PDG 01 values for  $B(J/\psi(1S) \rightarrow \ell^+ \ell^-)$  and  $B(\chi_{c1}, c_2 \rightarrow J/\psi(1S)\gamma)$ .

<sup>2</sup> CHEN 01 reports  $(9.8 \pm 4.8 \pm 1.5) \times 10^{-4}$  from a measurement of  $[\Gamma(B \rightarrow \chi_{c2}(1P)\text{anything})/\Gamma_{\text{total}}] \times [B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$ , which we rescale to our best value  $B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) = (19.8 \pm 0.8) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>3</sup> BALEST 95B assume  $B(\chi_{c2}(1P) \rightarrow J/\psi(1S)\gamma) = (13.5 \pm 1.1) \times 10^{-2}$ , the PDG 1994 value.  $J/\psi(1S)$  mesons are reconstructed in the  $e^+ e^-$  and  $\mu^+ \mu^-$  modes, and PDG 1994 branching fractions are used. If interpreted as signal, the  $35 \pm 13$  events correspond to  $B(B \rightarrow \chi_{c2}(1P)X) = (0.25 \pm 0.10 \pm 0.03) \times 10^{-2}$ .

WEIGHTED AVERAGE  
13 ± 4 (Error scaled by 1.9)


 $\Gamma(\chi_{c2}(1P)\text{anything})/\Gamma_{\text{total}}$ 
 $\Gamma_{52}/\Gamma$ 

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NODE=S049R24

NEW

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NODE=S049R24;LINKAGE=D

NODE=S049R21

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NODE=S049R21;LINKAGE=J3

NODE=S049R21;LINKAGE=D

$\Gamma(\chi_{c2}(1P)(\text{direct}) \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{53}/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>	
<b>0.00165±0.00031 OUR AVERAGE</b>			
0.00190±0.00045±0.00029	AUBERT	03F BABR $e^+ e^- \rightarrow \gamma(4S)$	
0.00153 <sup>+0.00023</sup> <sub>-0.00028</sub> ±0.00027	<sup>1</sup> ABE	02L BELL $e^+ e^- \rightarrow \gamma(4S)$	
1 ABE 02L uses PDG 01 values for $B(J/\psi(1S) \rightarrow \ell^+ \ell^-)$ and $B(\chi_{c1,c2} \rightarrow J/\psi(1S)\gamma)$ .			
$\Gamma(\eta_c(1S) \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{54}/\Gamma$		
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>&lt;0.009</b>	90	<sup>1</sup> BALEST	95B CLE2 $e^+ e^- \rightarrow \gamma(4S)$
1 BALEST 95B assume PDG 1994 values for sub mode branching ratios. $J/\psi(1S)$ mesons are reconstructed in $J/\psi(1S) \rightarrow e^+ e^-$ and $J/\psi(1S) \rightarrow \mu^+ \mu^-$ . Search region $2960 < m_{\eta_c(1S)} < 3010 \text{ MeV}/c^2$ .			
$\Gamma(KX(3872) \times B(X \rightarrow D^0 \bar{D}^0 \pi^0))/\Gamma_{\text{total}}$	$\Gamma_{55}/\Gamma$		
<u>VALUE (units <math>10^{-4}</math>)</u>		<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>1.22±0.31<sup>+0.23</sup><sub>-0.30</sub></b>		<sup>1</sup> GOKHROO	06 BELL $e^+ e^- \rightarrow \gamma(4S)$
1 Measure the near-threshold enhancements in the $(D^0 \bar{D}^0 \pi^0)$ system at a mass $3875.2 \pm 0.7^{+0.3}_{-1.6} \pm 0.8 \text{ MeV}/c^2$ .			
$\Gamma(KX(3872) \times B(X \rightarrow D^{*0} D^0))/\Gamma_{\text{total}}$	$\Gamma_{56}/\Gamma$		
<u>VALUE (units <math>10^{-4}</math>)</u>		<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>0.80±0.20±0.10</b>		AUSHEV	10 BELL $e^+ e^- \rightarrow \gamma(4S)$
$\Gamma(KX(3940) \times B(X \rightarrow D^{*0} D^0))/\Gamma_{\text{total}}$	$\Gamma_{57}/\Gamma$		
<u>VALUE (units <math>10^{-4}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>&lt;0.67</b>	90	AUSHEV	10 BELL $e^+ e^- \rightarrow \gamma(4S)$
$\Gamma(KX(3915) \times B(X \rightarrow \omega J/\psi))/\Gamma_{\text{total}}$	$\Gamma_{58}/\Gamma$		
<u>VALUE (units <math>10^{-5}</math>)</u>		<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>7.1±1.3±3.1</b>		<sup>1</sup> CHOI	05 BELL $e^+ e^- \rightarrow \gamma(4S)$
1 CHOI 05 reports the observation of a near-threshold enhancement in the $\omega J/\psi$ mass spectrum in exclusive $B \rightarrow K \omega J/\psi$ . The new state, denoted as $X(3915)$ , is measured to have a mass of $3943 \pm 11 \pm 13 \text{ GeV}/c^2$ and a width $\Gamma = 87 \pm 22 \pm 26 \text{ MeV}$ .			
$\Gamma(K^\pm \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{59}/\Gamma$		
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>0.789±0.025 OUR AVERAGE</b>			
0.82 ± 0.01 ± 0.05	ALBRECHT	94C ARG $e^+ e^- \rightarrow \gamma(4S)$	
0.775±0.015±0.025	<sup>1</sup> ALBRECHT	93I ARG $e^+ e^- \rightarrow \gamma(4S)$	
0.85 ± 0.07 ± 0.09	ALAM	87B CLEO $e^+ e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •			
seen	<sup>2</sup> BRODY	82 CLEO $e^+ e^- \rightarrow \gamma(4S)$	
seen	<sup>3</sup> GIANNINI	82 CUSB $e^+ e^- \rightarrow \gamma(4S)$	
1 ALBRECHT 93I value is not independent of the sum of $B \rightarrow K^+$ anything and $B \rightarrow K^-$ anything ALBRECHT 94C values.			
2 Assuming $\gamma(4S) \rightarrow B\bar{B}$ , a total of $3.38 \pm 0.34 \pm 0.68$ kaons per $\gamma(4S)$ decay is found (the second error is systematic). In the context of the standard $B$ -decay model, this leads to a value for $(b\text{-quark} \rightarrow c\text{-quark})/(b\text{-quark} \rightarrow \text{all})$ of $1.09 \pm 0.33 \pm 0.13$ .			
3 GIANNINI 82 at CESR-CUSB observed $1.58 \pm 0.35 K^0$ per hadronic event much higher than $0.82 \pm 0.10$ below threshold. Consistent with predominant $b \rightarrow c\bar{X}$ decay.			
$\Gamma(K^+ \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{60}/\Gamma$		
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u> <u>COMMENT</u>
<b>0.66 ±0.05</b>		<sup>1</sup> ALBRECHT	94C ARG $e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.620±0.013±0.038	<sup>2</sup> ALBRECHT	94C ARG $e^+ e^- \rightarrow \gamma(4S)$	
0.66 ± 0.05 ± 0.07	<sup>2</sup> ALAM	87B CLEO $e^+ e^- \rightarrow \gamma(4S)$	
1 Measurement relies on lepton-kaon correlations. It is for the weak decay vertex and does not include mixing of the neutral $B$ meson. Mixing effects were corrected for by assuming a mixing parameter $r$ of $(18.1 \pm 4.3)\%$ .			
2 Measurement relies on lepton-kaon correlations. It includes production through mixing of the neutral $B$ meson.			

$\Gamma(K^- \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{61}/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.13 ± 0.04</b>	1 ALBRECHT 94C	ARG	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			

0.165 ± 0.011 ± 0.036	2 ALBRECHT	94C	ARG	$e^+ e^- \rightarrow \gamma(4S)$
0.19 ± 0.05 ± 0.02	2 ALAM	87B	CLEO	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Measurement relies on lepton-kaon correlations. It is for the weak decay vertex and does not include mixing of the neutral  $B$  meson. Mixing effects were corrected for by assuming a mixing parameter  $r$  of  $(18.1 \pm 4.3)\%$ .

<sup>2</sup> Measurement relies on lepton-kaon correlations. It includes production through mixing of the neutral  $B$  meson.

$\Gamma(K^0/\bar{K}^0 \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{62}/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.64 ± 0.04 OUR AVERAGE</b>			
0.642 ± 0.010 ± 0.042	1 ALBRECHT	94C	ARG
0.63 ± 0.06 ± 0.06	ALAM	87B	CLEO

<sup>1</sup> ALBRECHT 94C assume a  $K^0/\bar{K}^0$  multiplicity twice that of  $K_S^0$ .

$\Gamma(K^*(892)^\pm \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{63}/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.182 ± 0.054 ± 0.024</b>	ALBRECHT	94J	ARG

$\Gamma(K^*(892)^0/\bar{K}^*(892)^0 \text{anything})/\Gamma_{\text{total}}$	$\Gamma_{64}/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.146 ± 0.016 ± 0.020</b>	ALBRECHT	94J	ARG

$\Gamma(K^*(892)\gamma)/\Gamma_{\text{total}}$	$\Gamma_{65}/\Gamma$			
<u>VALUE (units <math>10^{-5}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>4.24 ± 0.54 ± 0.32</b>		1 COAN 00	CLE2	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<150	90	2 LESIAK	92	CBAL
< 24	90	ALBRECHT	88H	ARG

<sup>1</sup> An average of  $B(B^+ \rightarrow K^*(892)^+\gamma)$  and  $B(B^0 \rightarrow K^*(892)^0\gamma)$  measurements reported in COAN 00 by assuming full correlated systematic errors.

<sup>2</sup> LESIAK 92 set a limit on the inclusive process  $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$  at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about  $s$ -quark hadronization.

$\Gamma(\eta K\gamma)/\Gamma_{\text{total}}$	$\Gamma_{66}/\Gamma$		
<u>VALUE (units <math>10^{-6}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>8.5 ± 1.3 ± 1.2</b>	1 NISHIDA 05	BELL	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup>  $m_{\eta K} < 2.4 \text{ GeV}/c^2$

$\Gamma(K_1(1400)\gamma)/\Gamma_{\text{total}}$	$\Gamma_{67}/\Gamma$			
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;12.7 × 10<sup>-5</sup></b>	90	1 COAN 00	CLE2	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< $1.6 \times 10^{-3}$	90	2 LESIAK	92	CBAL
< $4.1 \times 10^{-4}$	90	ALBRECHT	88H	ARG

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> LESIAK 92 set a limit on the inclusive process  $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$  at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about  $s$ -quark hadronization.

$\Gamma(K_2^*(1430)\gamma)/\Gamma_{\text{total}}$	$\Gamma_{68}/\Gamma$			
<u>VALUE (units <math>10^{-5}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.66 ± 0.59 ± 0.13</b>		1 COAN 00	CLE2	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<83	90	ALBRECHT	88H	ARG
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<sup>1</sup> COAN 00 obtains a fitted signal yield of  $15.9^{+5.7}_{-5.2}$  events. A search for contamination by  $K^*(1410)$  yielded a rate consistent with 0; the central value assumes no contamination.

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NODE=S049S28;LINKAGE=N2

$\Gamma(K_2(1770)\gamma)/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{69}/\Gamma$
$<1.2 \times 10^{-3}$	90	1 LESIAK	92	CBAL $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> LESIAK 92 set a limit on the inclusive process  $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$  at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about  $s$ -quark hadronization.

 $\Gamma(K_3^*(1780)\gamma)/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{70}/\Gamma$
$<3.7 \times 10^{-5}$	90	1 NISHIDA	05	BELL $e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<3.0 \times 10^{-3}$	90	ALBRECHT	88H	ARG $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Uses  $B(K_3^*(1780) \rightarrow \eta K) = 0.11^{+0.05}_{-0.04}$ .

 $\Gamma(K_4^*(2045)\gamma)/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{71}/\Gamma$
$<1.0 \times 10^{-3}$	90	1 LESIAK	92	CBAL $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> LESIAK 92 set a limit on the inclusive process  $B(b \rightarrow s\gamma) < 2.8 \times 10^{-3}$  at 90% CL for the range of masses of 892–2045 MeV, independent of assumptions about  $s$ -quark hadronization.

 $\Gamma(K\eta'(958))/\Gamma_{\text{total}}$ 

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{72}/\Gamma$
$(8.3^{+0.9}_{-0.8} \pm 0.7) \times 10^{-5}$	1 RICHICHI	00	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K^*(892)\eta'(958))/\Gamma_{\text{total}}$ 

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{73}/\Gamma$
$4.1^{+1.0}_{-0.9} \pm 0.5$		1 AUBERT	07E	BABR $e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

<22	90	1 RICHICHI	00	CLE2 $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K\eta)/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{74}/\Gamma$
$<5.2 \times 10^{-6}$	90	1 RICHICHI	00	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K^*(892)\eta)/\Gamma_{\text{total}}$ 

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{75}/\Gamma$
$(1.80^{+0.49}_{-0.43} \pm 0.18) \times 10^{-5}$	1 RICHICHI	00	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K\phi\phi)/\Gamma_{\text{total}}$ 

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT	$\Gamma_{76}/\Gamma$
$2.3^{+0.9}_{-0.8} \pm 0.3$	1 HUANG	03	BELL $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Assumes equal production of charged and neutral  $B$  meson pairs and isospin symmetry.

 $\Gamma(\bar{b} \rightarrow \bar{s}\gamma)/\Gamma_{\text{total}}$ 

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT	$\Gamma_{77}/\Gamma$
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**3.40 $\pm$ 0.21 OUR AVERAGE**

$[(3.53 \pm 0.24) \times 10^{-4}$  OUR 2012 AVERAGE]

3.52 $\pm$ 0.20 $\pm$ 0.51	1,2 LEES	12U BABR	$e^+ e^- \rightarrow \gamma(4S)$
3.32 $\pm$ 0.16 $\pm$ 0.31	1,3 LEES	12V BABR	$e^+ e^- \rightarrow \gamma(4S)$
3.47 $\pm$ 0.15 $\pm$ 0.40	1,4 LIMOSANI	09 BELL	$e^+ e^- \rightarrow \gamma(4S)$
3.90 $\pm$ 0.91 $\pm$ 0.64	1,5 AUBERT	08O BABR	$e^+ e^- \rightarrow \gamma(4S)$
3.36 $\pm$ 0.53 $\pm$ 0.65 $\pm$ 0.68	6 ABE	01F BELL	$e^+ e^- \rightarrow \gamma(4S)$
3.29 $\pm$ 0.44 $\pm$ 0.29	1,7 CHEN	01C CLE2	$e^+ e^- \rightarrow \gamma(4S)$

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NODE=S049R15

NEW

• • • We do not use the following data for averages, fits, limits, etc. • • •

$2.30 \pm 0.08 \pm 0.30$	8	DEL-AMO-SA..10M	BABR	$e^+ e^- \rightarrow \gamma(4S)$
$4.3 \pm 0.3 \pm 0.7$	9	AUBERT	09U	BABR Repl. by DEL-AMO-SANCHEZ 10M
$3.92 \pm 0.31 \pm 0.47$	1,10	AUBERT,BE	06B	BABR Repl. by LEES 12V
$3.49 \pm 0.20^{+0.59}_{-0.46}$	1,11	AUBERT,B	05R	BABR Repl. by LEES 12U
$3.50 \pm 0.32 \pm 0.31$	1,12	KOPPENBURG04	BELL	Repl. by LIMOSANI 09
$2.32 \pm 0.57 \pm 0.35$		ALAM	95	CLE2 Repl. by CHEN 01C

1 We correct it to  $E_\gamma > 1.6$  GeV using the method of BUCHMULLER 06 (average of three theoretical models).

2 Reports  $(3.29 \pm 0.19 \pm 0.48) \times 10^{-4}$  for  $E_\gamma > 1.9$  GeV.

3 Reports  $(3.21 \pm 0.15 \pm 0.29 \pm 0.08) \times 10^{-4}$  for  $1.8 < E_\gamma < 2.8$  GeV, where the last systematic uncertainty is for model dependency. Results with other cutoffs are also reported.

4 The measurement reported is  $(3.45 \pm 0.15 \pm 0.40) \times 10^{-4}$  for  $E_\gamma > 1.7$  GeV.

5 Uses a fully reconstructed  $B$  meson as a tag on the recoil side. The measurement reported is  $(3.66 \pm 0.85 \pm 0.60) \times 10^{-4}$  for  $E_\gamma > 1.9$  GeV.

6 ABE 01F reports their systematic errors  $(\pm 0.42^{+0.50}_{-0.54}) \times 10^{-4}$ , where the second error is due to the theoretical uncertainty. We combine them in quadrature.

7 The measurement reported is  $(3.21 \pm 0.43^{+0.32}_{-0.29}) \times 10^{-4}$  for  $E_\gamma > 2.0$  GeV.

8 Measured using sums of seven exclusive final states  $B \rightarrow X_{d(s)} \gamma$  where  $X_{d(s)}$  is a nonstrange (strange) charmless hadronic system in mass range 0.5–2.0  $\text{GeV}/c^2$ .

9 Measured using sums of seven exclusive final states  $B \rightarrow X_{d(s)} \gamma$  where  $X_{d(s)}$  is a nonstrange (strange) charmless hadronic system in mass range 0.6–1.8  $\text{GeV}/c^2$ .

10 The measurement reported is  $(3.67 \pm 0.29 \pm 0.45) \times 10^{-4}$  for  $E_\gamma > 1.9$  GeV.

11 The measurement reported is  $(3.27 \pm 0.18^{+0.55}_{-0.42}) \times 10^{-4}$  for  $E_\gamma > 1.9$  GeV.

12 The measurement reported is  $(3.55 \pm 0.32 \pm 0.32) \times 10^{-4}$  for  $E_\gamma > 1.8$  GeV.

### $\Gamma(\bar{b} \rightarrow \bar{d}\gamma)/\Gamma_{\text{total}}$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>9.2±2.0±2.3</b>	1 DEL-AMO-SA..10M	BABR	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

14 $\pm 5 \pm 4$	2 AUBERT	09U	BABR Repl. by DEL-AMO-SANCHEZ 10M
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1 Measured using sums of seven exclusive final states  $B \rightarrow X_{d(s)} \gamma$  where  $X_{d(s)}$  is a nonstrange (strange) charmless hadronic system in mass range 0.5–2.0  $\text{GeV}/c^2$ .

2 Measured using sums of seven exclusive final states  $B \rightarrow X_{d(s)} \gamma$  where  $X_{d(s)}$  is a nonstrange (strange) charmless hadronic system in mass range 0.6–1.8  $\text{GeV}/c^2$ .

### $\Gamma(\bar{b} \rightarrow \bar{d}\gamma)/\Gamma(\bar{b} \rightarrow \bar{s}\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.040±0.009±0.010</b>	1 DEL-AMO-SA..10M	BABR	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.033 $\pm 0.013 \pm 0.009$	2 AUBERT	09U	BABR Repl. by DEL-AMO-SANCHEZ 10M
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1 Measured using sums of seven exclusive final states  $B \rightarrow X_{d(s)} \gamma$  where  $X_{d(s)}$  is a nonstrange (strange) charmless hadronic system in mass range 0.5–2.0  $\text{GeV}/c^2$ .

2 Measured using sums of seven exclusive final states  $B \rightarrow X_{d(s)} \gamma$  where  $X_{d(s)}$  is a nonstrange (strange) charmless hadronic system in mass range 0.6–1.8  $\text{GeV}/c^2$ .

### $\Gamma(\bar{b} \rightarrow \bar{s}\text{gluon})/\Gamma_{\text{total}}$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.068</b>	90	1	COAN	98	CLE2 $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.08	2	2 ALBRECHT	95D	ARG	$e^+ e^- \rightarrow \gamma(4S)$
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1 COAN 98 uses  $D$ - $\ell$  correlation.

2 ALBRECHT 95D use full reconstruction of one  $B$  decay as tag. Two candidate events for charmless  $B$  decay can be interpreted as either  $b \rightarrow s\text{gluon}$  or  $b \rightarrow u$  transition. If interpreted as  $b \rightarrow s\text{gluon}$  they find a branching ratio of  $\sim 0.026$  or the upper limit quoted above. Result is highly model dependent.

NODE=S049R15;LINKAGE=AA

NODE=S049R15;LINKAGE=LS

NODE=S049R15;LINKAGE=LE

NODE=S049R15;LINKAGE=LI

NODE=S049R15;LINKAGE=UB

NODE=S049R15;LINKAGE=FA

NODE=S049R15;LINKAGE=KO

NODE=S049R15;LINKAGE=DE

NODE=S049R15;LINKAGE=AE

NODE=S049R15;LINKAGE=AB

NODE=S049R15;LINKAGE=AU

NODE=S049R15;LINKAGE=CE

NODE=S049R38

NODE=S049R38

NODE=S049R38;LINKAGE=DE

NODE=S049R38;LINKAGE=AE

NODE=S049R39

NODE=S049R39

NODE=S049R39;LINKAGE=DE

NODE=S049R39;LINKAGE=AE

NODE=S049R14

NODE=S049R14

NODE=S049R14;LINKAGE=B

NODE=S049R14;LINKAGE=A

$\Gamma(\eta \text{ anything})/\Gamma_{\text{total}}$					$\Gamma_{80}/\Gamma$
<u>VALUE (units <math>10^{-4}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>2.61 \pm 0.30^{+0.44}_{-0.74}</math></b>		1 NISHIMURA	10 BELL	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049R47 NODE=S049R47

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.69 \pm 0.29^{+0.36}_{-0.62}$		2 NISHIMURA	10 BELL	$e^+ e^- \rightarrow \gamma(4S)$
$< 4.4$	90	3 BROWDER	98 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

1 Uses  $B \rightarrow \eta X_s$  with  $0.4 < m_{X_s} < 2.6 \text{ GeV}/c^2$ .

2 Uses  $B \rightarrow \eta X_s$  with  $1.8 < m_{X_s} < 2.6 \text{ GeV}/c^2$ .

3 BROWDER 98 search for high momentum  $B \rightarrow \eta X_s$  between 2.1 and 2.7  $\text{GeV}/c$ .

$\Gamma(\eta' \text{ anything})/\Gamma_{\text{total}}$					$\Gamma_{81}/\Gamma$
<u>VALUE (units <math>10^{-4}</math>)</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>4.2 \pm 0.9 \text{ OUR AVERAGE}</math></b>					NODE=S049R48 NODE=S049R48

$3.9 \pm 0.8 \pm 0.9$		1 AUBERT,B	04F BABR	$e^+ e^- \rightarrow \gamma(4S)$
$4.6 \pm 1.1 \pm 0.6$		2 BONVICINI	03 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$6.2 \pm 1.6^{+1.3}_{-2.0}$		3 BROWDER	98 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
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1 AUBERT,B 04F reports branching ratio  $B \rightarrow \eta' X_s$  for high momentum  $\eta'$  between 2.0 and 2.7  $\text{GeV}/c$  in the  $\gamma(4S)$  center-of-mass frame.  $X_s$  represents a recoil system consisting of a kaon and zero to four pions.

2 BONVICINI 03 observed a signal of  $61.2 \pm 13.9$  events in  $B \rightarrow \eta' X_{nc}$  production for high momentum  $\eta'$  between 2.0 and 2.7  $\text{GeV}/c$  in the  $\gamma(4S)$  center-of-mass frame. The  $X_{nc}$  denotes "charmless" hadronic states recoiling against  $\eta'$ . The second error combines systematic and background subtraction uncertainties in quadrature.

3 BROWDER 98 observed a signal of  $39.0 \pm 11.6$  events in high momentum  $B \rightarrow \eta' X_s$  production between 2.0 and 2.7  $\text{GeV}/c$ . The branching fraction is based on the interpretation of  $b \rightarrow sg$ , where the last error includes additional uncertainties due to the color-suppressed  $b \rightarrow$  backgrounds.

$\Gamma(K^+ \text{ gluon (charmless)})/\Gamma_{\text{total}}$					$\Gamma_{82}/\Gamma$
<u>VALUE (units <math>10^{-4}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>&lt; 1.87</math></b>	90	1 DEL-AMO-SA..11	BABR	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049R84 NODE=S049R84

1  $B \rightarrow K^+ X$  with  $m_X < 1.69 \text{ GeV}/c^2$ .

$\Gamma(K^0 \text{ gluon (charmless)})/\Gamma_{\text{total}}$					$\Gamma_{83}/\Gamma$
<u>VALUE (units <math>10^{-4}</math>)</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>1.95^{+0.51}_{-0.45} \pm 0.50</math></b>		1 DEL-AMO-SA..11	BABR	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049R85 NODE=S049R85

1  $B \rightarrow K^0 X$  with  $m_X < 1.69 \text{ GeV}/c^2$ .

$\Gamma(\rho\gamma)/\Gamma_{\text{total}}$					$\Gamma_{84}/\Gamma$
<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>1.39 \pm 0.25 \text{ OUR AVERAGE}</math></b>				Error includes scale factor of 1.2.	NODE=S049R54 NODE=S049R54

1,2 AUBERT 08BH BABR  $e^+ e^- \rightarrow \gamma(4S)$

1,2 TANIGUCHI 08 BELL  $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.36^{+0.29}_{-0.27} \pm 0.10$		1,3 AUBERT	07L BABR	Repl. by AUBERT 08BH
$< 1.9$	90	1,3 AUBERT	04C BABR	Repl. by AUBERT 07L
$< 14$	90	1,4 COAN	00 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

1 Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

2 Assumes  $\Gamma(B \rightarrow \rho\gamma) = \Gamma(B^+ \rightarrow \rho^+\gamma) = 2 \Gamma(B^0 \rightarrow \rho^0\gamma)$  and uses lifetime ratio of  $\tau_{B^+}/\tau_{B^0} = 1.071 \pm 0.009$ .

3 Assumes  $\Gamma(B \rightarrow \rho\gamma) = \Gamma(B^+ \rightarrow \rho^+\gamma) = 2 \Gamma(B^0 \rightarrow \rho^0\gamma)$  and uses lifetime ratio of  $\tau_{B^+}/\tau_{B^0} = 1.083 \pm 0.017$ .

4 COAN 00 reports  $B(B \rightarrow \rho\gamma)/B(B \rightarrow K^*(892)\gamma) < 0.32$  at 90%CL and scaled by the central value of  $B(B \rightarrow K^*(892)\gamma) = (4.24 \pm 0.54 \pm 0.32) \times 10^{-5}$ .

$\Gamma(\rho\gamma)/\Gamma(K^*(892)\gamma)$					$\Gamma_{84}/\Gamma_{65}$
<u>VALUE (units <math>10^{-2}</math>)</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>3.02^{+0.60+0.26}_{-0.55-0.28}</math></b>		TANIGUCHI	08 BELL	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049RW3 NODE=S049RW3

$\Gamma(\rho/\omega\gamma)/\Gamma_{\text{total}}$ 

<u>VALUE</u> (units $10^{-6}$ )	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{85}/\Gamma$
<b><math>1.30 \pm 0.23</math> OUR AVERAGE</b>				Error includes scale factor of 1.2.	
$1.63^{+0.30}_{-0.28} \pm 0.16$	1,2,3	AUBERT	08BH BABR	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049RW1 NODE=S049RW1
$1.14^{+0.10}_{-0.12} \pm 0.10$	1,3	TANIGUCHI	08 BELL	$e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.25^{+0.25}_{-0.24} \pm 0.09$	4	AUBERT	07L BABR	Repl. by AUBERT 08BH	
$1.32^{+0.34}_{-0.31} \pm 0.10$	4	MOHAPATRA	06 BELL	Repl. by TANIGUCHI 08	
$0.6 \pm 0.3 \pm 0.1$	4	AUBERT	05 BABR	Repl. by AUBERT 07L	
$<1.4$	90	4 MOHAPATRA	05 BELL	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Assumes  $\Gamma(B \rightarrow \rho\gamma) = \Gamma(B^+ \rightarrow \rho^+\gamma) = 2\Gamma(B^0 \rightarrow \rho^0\gamma)$  and uses lifetime ratio of  $\tau_{B^+}/\tau_{B^0} = 1.071 \pm 0.009$ .

<sup>2</sup> Also reports  $|V_{td}/V_{ts}| = 0.233^{+0.025}_{-0.024} \pm 0.021$ .

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>4</sup> Assumes  $\Gamma(B \rightarrow \rho\gamma) = \Gamma(B^+ \rightarrow \rho^+\gamma) = 2\Gamma(B^0 \rightarrow \rho^0\gamma)$  and uses lifetime ratio of  $\tau_{B^+}/\tau_{B^0} = 1.083 \pm 0.017$ .

 $\Gamma(\rho/\omega\gamma)/\Gamma(K^*(892)\gamma)$ 

<u>VALUE</u> (units $10^{-2}$ )	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{85}/\Gamma_{65}$
<b><math>2.84 \pm 0.50 \pm 0.27</math></b>	<b><math>-0.29</math></b>	1 TANIGUCHI	08 BELL	$e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<3.5$	90	MOHAPATRA	05 BELL	Repl. by TANIGUCHI 08
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<sup>1</sup> Also reports  $|V_{td}/V_{ts}| = 0.195^{+0.020}_{-0.019} \pm 0.015$ .

 $\Gamma(\pi^\pm \text{ anything})/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{86}/\Gamma$
<b><math>3.585 \pm 0.025 \pm 0.070</math></b>	1 ALBRECHT	93I ARG	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> ALBRECHT 93 excludes  $\pi^\pm$  from  $K_S^0$  and  $\Lambda$  decays. If included, they find  $4.105 \pm 0.025 \pm 0.080$ .

 $\Gamma(\pi^0 \text{ anything})/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{87}/\Gamma$
<b><math>2.35 \pm 0.02 \pm 0.11</math></b>	1 ABE	01J BELL	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> From fully inclusive  $\pi^0$  yield with no corrections from decays of  $K_S^0$  or other particles.

 $\Gamma(\eta \text{ anything})/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{88}/\Gamma$
<b><math>0.176 \pm 0.011 \pm 0.012</math></b>	KUBOTA	96 CLE2	$e^+ e^- \rightarrow \gamma(4S)$	

 $\Gamma(\rho^0 \text{ anything})/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{89}/\Gamma$
<b><math>0.208 \pm 0.042 \pm 0.032</math></b>	ALBRECHT	94J ARG	$e^+ e^- \rightarrow \gamma(4S)$	

 $\Gamma(\omega \text{ anything})/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{90}/\Gamma$
<b><math>&lt;0.81</math></b>	90	ALBRECHT	94J ARG	$e^+ e^- \rightarrow \gamma(4S)$	

 $\Gamma(\phi \text{ anything})/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_{91}/\Gamma$
<b><math>0.0343 \pm 0.0012</math> OUR AVERAGE</b>	HUANG	07 CLEO	$e^+ e^- \rightarrow \gamma(4S)$	

$0.0353 \pm 0.0005 \pm 0.0030$

$0.0341 \pm 0.0006 \pm 0.0012$

$0.0390 \pm 0.0030 \pm 0.0035$

$0.023 \pm 0.006 \pm 0.005$

 $\Gamma(\phi K^*(892))/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	$\Gamma_{92}/\Gamma$
<b><math>&lt;2.2 \times 10^{-5}</math></b>	90	1 BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

NODE=S049RW1

NODE=S049RW1

NODE=S049RW1;LINKAGE=AR

NODE=S049RW1;LINKAGE=AU

NODE=S049RW1;LINKAGE=EP

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NODE=S049R11

NODE=S049R11

NODE=S049S15

NODE=S049S15

NODE=S049R46

NODE=S049R46

NODE=S049R46;LINKAGE=EQ

$\Gamma(\pi^+ \text{ gluon (charmless)})/\Gamma_{\text{total}}$ 

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT	$\Gamma_{94}/\Gamma$
<b><math>3.72^{+0.50}_{-0.47} \pm 0.59</math></b>	<sup>1</sup> DEL-AMO-SA..11	BABR	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup>  $B \rightarrow \pi^+ X$  with  $m_X < 1.71 \text{ GeV}/c^2$ .

 $\Gamma(\Lambda_c^+ / \bar{\Lambda}_c^- \text{ anything})/\Gamma_{\text{total}}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{95}/\Gamma$
<b><math>0.045 \pm 0.003 \pm 0.012</math></b>	1	AUBERT	07C	BABR $e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.064 \pm 0.008 \pm 0.008$	2	CRAWFORD	92	CLEO $e^+ e^- \rightarrow \gamma(4S)$	
$0.14 \pm 0.09$	3	ALBRECHT	88E	ARG $e^+ e^- \rightarrow \gamma(4S)$	
$<0.112$	90	ALAM	87	CLEO $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> AUBERT 07C reports  $0.045 \pm 0.003 \pm 0.012$  from a measurement of  $[\Gamma(B \rightarrow \Lambda_c^+ / \bar{\Lambda}_c^- \text{ anything})/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ .

<sup>2</sup> CRAWFORD 92 result derived from lepton baryon correlations. Assumes all charmed baryons in  $B^0$  and  $B^\pm$  decay are  $\Lambda_c$ .

<sup>3</sup> ALBRECHT 88E measured  $B(B \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (0.30 \pm 0.12 \pm 0.06)\%$  and used  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (2.2 \pm 1.0)\%$  from ABRAMS 80 to obtain above number.

<sup>4</sup> Assuming all baryons result from charmed baryons, ALAM 86 conclude the branching fraction is  $7.4 \pm 2.9\%$ . The limit given above is model independent.

 $\Gamma(\Lambda_c^+ \text{ anything})/\Gamma(\bar{\Lambda}_c^- \text{ anything})$ 

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{96}/\Gamma_{97}$
<b><math>0.19 \pm 0.13 \pm 0.04</math></b>	<sup>1</sup> AMMAR	97	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> AMMAR 97 uses a high-momentum lepton tag ( $P_\ell > 1.4 \text{ GeV}/c^2$ ).

 $\Gamma(\bar{\Lambda}_c^- \mu^+ \text{ anything})/\Gamma(\bar{\Lambda}_c^- \text{ anything})$ 

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT	$\Gamma_{100}/\Gamma_{97}$
<b><math>-2.0 \pm 2.0 \pm 1.9</math></b>	LEES	12	BABR $e^+ e^- \rightarrow \gamma(4S)$	

 $\Gamma(\bar{\Lambda}_c^- \ell^+ \text{ anything})/\Gamma(\Lambda_c^+ / \bar{\Lambda}_c^- \text{ anything})$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{98}/\Gamma_{95}$
<b><math>&lt;2.5 \times 10^{-2}</math></b>	90	<sup>1</sup> LEES	12	BABR $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> LEES 12 quotes also the measurement  $\Gamma(B \rightarrow \bar{\Lambda}_c^- \ell^+ \text{ anything})/\Gamma(B \rightarrow \Lambda_c^+ / \bar{\Lambda}_c^- \text{ anything}) = (1.2 \pm 0.7 \pm 0.4) \times 10^{-2}$ .

 $\Gamma(\bar{\Lambda}_c^- e^+ \text{ anything})/\Gamma(\Lambda_c^+ / \bar{\Lambda}_c^- \text{ anything})$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{99}/\Gamma_{95}$
<b><math>&lt;0.05 \text{ (CL = 90\%)} &lt; 0.025 \text{ (CL = 90\%) OUR 2012 BEST LIMIT}</math></b>					
<b><math>&lt;0.05</math></b>	90	<sup>1</sup> BONVICINI	98	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> BONVICINI 98 uses the electron with momentum above  $0.6 \text{ GeV}/c$ .

 $\Gamma(\bar{\Lambda}_c^- e^+ \text{ anything})/\Gamma(\bar{\Lambda}_c^- \text{ anything})$ 

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT	$\Gamma_{99}/\Gamma_{97}$
<b><math>2.5 \pm 1.1 \pm 0.6</math></b>	<sup>1</sup> LEES	12	BABR $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> Uses the full reconstruction of the recoiling  $B$  in a hadronic decay as a tag.

 $\Gamma(\bar{\Lambda}_c^- \ell^+ \text{ anything})/\Gamma(\bar{\Lambda}_c^- \text{ anything})$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{98}/\Gamma_{97}$
<b><math>&lt;3.5 \times 10^{-2}</math></b>	90	<sup>1</sup> LEES	12	BABR $e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> LEES 12 quotes also the measurement  $\Gamma(B \rightarrow \bar{\Lambda}_c^- \ell^+ \text{ anything})/\Gamma(B \rightarrow \bar{\Lambda}_c^- \text{ anything}) = (1.7 \pm 1.0 \pm 0.6) \times 10^{-2}$ .

 $\Gamma(\bar{\Lambda}_c^- p \text{ anything})/\Gamma(\Lambda_c^+ / \bar{\Lambda}_c^- \text{ anything})$ 

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_{101}/\Gamma_{95}$
<b><math>0.57 \pm 0.05 \pm 0.05</math></b>	BONVICINI	98	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	

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NODE=S049R86

NODE=S049R86;LINKAGE=DA

NODE=S049S16  
NODE=S049S16

NODE=S049S16;LINKAGE=AU

NODE=S049S16;LINKAGE=D

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NODE=S049S16;LINKAGE=A

NODE=S049R41  
NODE=S049R41

NODE=S049R41;LINKAGE=A

NODE=S049R03  
NODE=S049R03

NODE=S049R04  
NODE=S049R04

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NODE=S049R28  
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NODE=S049R01

NODE=S049R01;LINKAGE=LE

NODE=S049R02  
NODE=S049R02

NODE=S049R02;LINKAGE=LE

NODE=S049R29  
NODE=S049R29

$\Gamma(\bar{\Lambda}_c^- p e^+ \nu_e)/\Gamma(\bar{\Lambda}_c^- p \text{anything})$					$\Gamma_{102}/\Gamma_{101}$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<b>&lt;0.04</b>	90	1 BONVICINI	98	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	
1 BONVICINI 98 uses the electron with momentum above 0.6 GeV/c.					

$\Gamma(\bar{\Sigma}_c^{--} \text{anything})/\Gamma_{\text{total}}$					$\Gamma_{103}/\Gamma$
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
<b>0.0042 ± 0.0021 ± 0.0011</b>	77	1 PROCARIO	94	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	
1 PROCARIO 94 reports $[\Gamma(B \rightarrow \bar{\Sigma}_c^{--} \text{anything})/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)] = 0.00021 \pm 0.00008 \pm 0.00007$ which we divide by our best value $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.					

$\Gamma(\bar{\Sigma}_c^- \text{anything})/\Gamma_{\text{total}}$					$\Gamma_{104}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<b>&lt;0.010</b>	90	1 PROCARIO	94	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	
1 PROCARIO 94 reports $[\Gamma(B \rightarrow \bar{\Sigma}_c^- \text{anything})/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)] < 0.00048$ which we divide by our best value $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 5.0 \times 10^{-2}$ .					

$\Gamma(\bar{\Sigma}_c^0 \text{anything})/\Gamma_{\text{total}}$					$\Gamma_{105}/\Gamma$
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
<b>0.0046 ± 0.0021 ± 0.0012</b>	76	1 PROCARIO	94	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	
1 PROCARIO 94 reports $[\Gamma(B \rightarrow \bar{\Sigma}_c^0 \text{anything})/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)] = 0.00023 \pm 0.00008 \pm 0.00007$ which we divide by our best value $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.					

$\Gamma(\bar{\Sigma}_c^0 N(N=p \text{ or } n))/\Gamma_{\text{total}}$					$\Gamma_{106}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<b>&lt;1.5 × 10<sup>-3</sup></b>	90	1 PROCARIO	94	CLE2 $e^+ e^- \rightarrow \gamma(4S)$	
1 PROCARIO 94 reports $< 0.0017$ from a measurement of $[\Gamma(B \rightarrow \bar{\Sigma}_c^0 N(N=p \text{ or } n))/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$ assuming $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.043$ , which we rescale to our best value $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 5.0 \times 10^{-2}$ .					

$\Gamma(\Xi_c^0 \text{anything} \times B(\Xi_c^0 \rightarrow \Xi^- \pi^+))/\Gamma_{\text{total}}$					$\Gamma_{107}/\Gamma$
VALUE (units 10 <sup>-3</sup> )	DOCUMENT ID	TECN	COMMENT		
<b>0.193 ± 0.030 OUR AVERAGE</b>			Error includes scale factor of 1.1.		
0.211 ± 0.019 ± 0.025	1 AUBERT,B	05M BABR	$e^+ e^- \rightarrow \gamma(4S)$		
0.144 ± 0.048 ± 0.021	2 BARISH	97 CLE2	$e^+ e^- \rightarrow \gamma(4S)$		

1 The yield is obtained by requiring the momentum  $P < 2.15$  GeV/c.

2 BARISH 97 find  $79 \pm 27 \Xi_c^0$  events.

$\Gamma(\Xi_c^+ \text{anything} \times B(\Xi_c^+ \rightarrow \Xi^- \pi^+ \pi^+))/\Gamma_{\text{total}}$					$\Gamma_{108}/\Gamma$
VALUE (units 10 <sup>-3</sup> )	DOCUMENT ID	TECN	COMMENT		
<b>0.453 ± 0.096<sup>+0.085</sup><sub>-0.065</sub></b>	1 BARISH	97 CLE2	$e^+ e^- \rightarrow \gamma(4S)$		

1 BARISH 97 find  $125 \pm 28 \Xi_c^+$  events.

$\Gamma(p/\bar{p} \text{anything})/\Gamma_{\text{total}}$					$\Gamma_{109}/\Gamma$
INCLUDES p AND $\bar{p}$ FROM $\Lambda$ AND $\bar{\Lambda}$ DECAY.	DOCUMENT ID	TECN	COMMENT		
<b>0.080 ± 0.004 OUR AVERAGE</b>					
0.080 ± 0.005 ± 0.005	ALBRECHT	93I ARG	$e^+ e^- \rightarrow \gamma(4S)$		
0.080 ± 0.005 ± 0.003	CRAWFORD	92 CLEO	$e^+ e^- \rightarrow \gamma(4S)$		
0.082 ± 0.005 <sup>+0.013</sup> <sub>-0.010</sub> 2163	1 ALBRECHT	89K ARG	$e^+ e^- \rightarrow \gamma(4S)$		

• • • We do not use the following data for averages, fits, limits, etc. • • •

>0.021 <sup>2</sup> ALAM 83B CLEO  $e^+ e^- \rightarrow \gamma(4S)$

1 ALBRECHT 89K include direct and nondirect protons.

2 ALAM 83B reported their result as  $> 0.036 \pm 0.006 \pm 0.009$ . Data are consistent with equal yields of  $p$  and  $\bar{p}$ . Using assumed yields below cut,  $B(B \rightarrow p + X) = 0.03$  not including protons from  $\Lambda$  decays.

NODE=S049R30  
NODE=S049R30

NODE=S049R30;LINKAGE=A

NODE=S049S78  
NODE=S049S78

NODE=S049S78;LINKAGE=A

NODE=S049S79  
NODE=S049S79

NODE=S049S79;LINKAGE=A

NODE=S049S80  
NODE=S049S80

NODE=S049S80;LINKAGE=A

NODE=S049R42  
NODE=S049R42

NODE=S049R42;LINKAGE=AU

NODE=S049R42;LINKAGE=A

NODE=S049R43  
NODE=S049R43

NODE=S049R43;LINKAGE=A

NODE=S049S9  
NODE=S049S9  
NODE=S049S9

NODE=S049S9;LINKAGE=AK

NODE=S049S9;LINKAGE=A

$\Gamma(p/\bar{p}(\text{direct}) \text{ anything})/\Gamma_{\text{total}}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{110}/\Gamma$
<b>0.055±0.005 OUR AVERAGE</b>					
0.055±0.005±0.0035		ALBRECHT 93I	ARG	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S30
0.056±0.006±0.005		CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S30
0.055±0.016	1220	<sup>1</sup> ALBRECHT 89K	ARG	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> ALBRECHT 89K subtract contribution of  $\Lambda$  decay from the inclusive proton yield.

 $\Gamma(\Lambda/\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{111}/\Gamma$
<b>0.040±0.005 OUR AVERAGE</b>					
0.038±0.004±0.006	2998	CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S10
0.042±0.005±0.006	943	ALBRECHT 89K	ARG	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S10

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.022±0.003±0.0022		<sup>1</sup> ACKERSTAFF 97N	OPAL	$e^+ e^- \rightarrow Z$	
>0.011		<sup>2</sup> ALAM 83B	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	

<sup>1</sup> ACKERSTAFF 97N assumes  $B(b \rightarrow B) = 0.868 \pm 0.041$ , i.e., an admixture of  $B^0$ ,  $B^\pm$ , and  $B_s$ .

<sup>2</sup> ALAM 83B reported their result as  $> 0.022 \pm 0.007 \pm 0.004$ . Values are for  $(B(\Lambda X) + B(\bar{\Lambda} X))/2$ . Data are consistent with equal yields of  $p$  and  $\bar{p}$ . Using assumed yields below cut,  $B(B \rightarrow \Lambda X) = 0.03$ .

 $\Gamma(\Lambda\text{anything})/\Gamma(\bar{\Lambda}\text{anything})$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{112}/\Gamma_{113}$
<b>0.43±0.09±0.07</b>		<sup>1</sup> AMMAR 97	CLE2	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049R40

<sup>1</sup> AMMAR 97 uses a high-momentum lepton tag ( $P_\ell > 1.4 \text{ GeV}/c^2$ ).

 $\Gamma(\Xi^-/\Xi^+ \text{ anything})/\Gamma_{\text{total}}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{114}/\Gamma$
<b>0.0027±0.0006 OUR AVERAGE</b>					
0.0027±0.0005±0.0004	147	CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S31
0.0028±0.0014	54	ALBRECHT 89K	ARG	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S31

 $\Gamma(\text{baryons anything})/\Gamma_{\text{total}}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{115}/\Gamma$
<b>0.068±0.005±0.003</b>		<sup>1</sup> ALBRECHT 920	ARG	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S32

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.076±0.014		<sup>2</sup> ALBRECHT 89K	ARG	$e^+ e^- \rightarrow \gamma(4S)$
-------------	--	---------------------------	-----	----------------------------------

<sup>1</sup> ALBRECHT 920 result is from simultaneous analysis of  $p$  and  $\Lambda$  yields,  $p\bar{p}$  and  $\Lambda\bar{\Lambda}$  correlations, and various lepton-baryon and lepton-baryon-antibaryon correlations. Supersedes ALBRECHT 89K.

<sup>2</sup> ALBRECHT 89K obtain this result by adding their measurements ( $5.5 \pm 1.6\%$ ) for direct protons and ( $4.2 \pm 0.5 \pm 0.6\%$ ) for inclusive  $\Lambda$  production. They then assume ( $5.5 \pm 1.6\%$ ) for neutron production and add it in also. Since each  $B$  decay has two baryons, they divide by 2 to obtain ( $7.6 \pm 1.4\%$ ).

 $\Gamma(p\bar{p}\text{anything})/\Gamma_{\text{total}}$ 

INCLUDES $p$ AND $\bar{p}$ FROM $\Lambda$ AND $\bar{\Lambda}$ DECAY.	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{116}/\Gamma$
<b>0.0247±0.0023 OUR AVERAGE</b>					
0.024 ± 0.001 ± 0.004		CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S33
0.025 ± 0.002 ± 0.002	918	ALBRECHT 89K	ARG	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S33

 $\Gamma(p\bar{p}\text{anything})/\Gamma(p/\bar{p}\text{anything})$ 

INCLUDES $p$ AND $\bar{p}$ FROM $\Lambda$ AND $\bar{\Lambda}$ DECAY.	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{116}/\Gamma_{109}$
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>					
0.30±0.02±0.05		<sup>1</sup> CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S44

<sup>1</sup> CRAWFORD 92 value is not independent of their  $\Gamma(p\bar{p}\text{anything})/\Gamma_{\text{total}}$  value.

 $\Gamma(\Lambda\bar{p}/\bar{\Lambda}p\text{anything})/\Gamma_{\text{total}}$ 

INCLUDES $p$ AND $\bar{p}$ FROM $\Lambda$ AND $\bar{\Lambda}$ DECAY.	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{117}/\Gamma$
<b>0.025±0.004 OUR AVERAGE</b>					
0.029±0.005±0.005		CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S34
0.023±0.004±0.003	165	ALBRECHT 89K	ARG	$e^+ e^- \rightarrow \gamma(4S)$	NODE=S049S34

$\Gamma(\Lambda\bar{p}/\bar{\Lambda}p\text{anything})/\Gamma(\Lambda/\bar{\Lambda}\text{anything})$  $\Gamma_{117}/\Gamma_{111}$ Includes  $p$  and  $\bar{p}$  from  $\Lambda$  and  $\bar{\Lambda}$  decay.

VALUE	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$0.76 \pm 0.11 \pm 0.08$	<sup>1</sup> CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
$1$ CRAWFORD 92 value is not independent of their $[\Gamma(\Lambda\bar{p}\text{anything}) + \Gamma(\bar{\Lambda}p\text{anything})]/\Gamma_{\text{total}}$ value.			

 $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$  $\Gamma_{118}/\Gamma$ 

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.005	90		CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
<0.0088	90	12	ALBRECHT	89K ARG	$e^+ e^- \rightarrow \gamma(4S)$

 $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma(\Lambda/\bar{\Lambda}\text{anything})$  $\Gamma_{118}/\Gamma_{111}$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.13	90	<sup>1</sup> CRAWFORD 92	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
1 CRAWFORD 92 value is not independent of their $\Gamma(\Lambda\bar{\Lambda}\text{anything})/\Gamma_{\text{total}}$ value.				

 $\Gamma(se^+e^-)/\Gamma_{\text{total}}$  $\Gamma_{119}/\Gamma$ Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>4.7 <math>\pm 1.3</math> OUR AVERAGE</b>				
$4.04 \pm 1.30^{+0.87}_{-0.83}$		<sup>1</sup> IWASAKI 05	BELL	$e^+ e^- \rightarrow \gamma(4S)$
$6.0 \pm 1.7 \pm 1.3$		<sup>2</sup> AUBERT,B 04I	BABR	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$5.0 \pm 2.3^{+1.3}_{-1.1}$		KANEKO 03	BELL	Repl. by IWASAKI 05
< 57	90	GLENN 98	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
<50000	90	BEBEK 81	CLEO	$e^+ e^- \rightarrow \gamma(4S)$

1 Requires  $M_{\ell^+\ell^-} > 0.2 \text{ GeV}/c^2$ .2 Requires  $M_{e^+e^-} > 0.2 \text{ GeV}/c^2$ . $\Gamma(s\mu^+\mu^-)/\Gamma_{\text{total}}$  $\Gamma_{120}/\Gamma$ Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>4.3 <math>\pm 1.2</math> OUR AVERAGE</b>				
$4.13 \pm 1.05^{+0.85}_{-0.81}$		<sup>1</sup> IWASAKI 05	BELL	$e^+ e^- \rightarrow \gamma(4S)$
$5.0 \pm 2.8 \pm 1.2$		AUBERT,B 04I	BABR	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$7.9 \pm 2.1^{+2.1}_{-1.5}$		KANEKO 03	BELL	Repl. by IWASAKI 05
< 58	90	GLENN 98	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
<17000	90	CHADWICK 81	CLEO	$e^+ e^- \rightarrow \gamma(4S)$

1 Requires  $M_{\ell^+\ell^-} > 0.2 \text{ GeV}/c^2$ . $[\Gamma(se^+e^-) + \Gamma(s\mu^+\mu^-)]/\Gamma_{\text{total}}$  $(\Gamma_{119} + \Gamma_{120})/\Gamma$ Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<4.2 \times 10^{-5}$	90	GLENN 98	CLEO	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.0024	90	<sup>1</sup> BEAN 87	CLEO	Repl. by GLENN 98
<0.0062	90	<sup>2</sup> AVERY 84	CLEO	Repl. by BEAN 87

1 BEAN 87 reports  $[(\mu^+\mu^-) + (e^+e^-)]/2$  and we converted it.2 Determine ratio of  $B^+$  to  $B^0$  semileptonic decays to be in the range 0.25–2.9.

NODE=S049S43

NODE=S049S43

NODE=S049S43

NODE=S049S43;LINKAGE=AA

NODE=S049S35

NODE=S049S35

NODE=S049S42

NODE=S049S42

NODE=S049S42;LINKAGE=AA

NODE=S049S3

NODE=S049S3

NODE=S049S3

NODE=S049S3;LINKAGE=IW

NODE=S049S3;LINKAGE=KN

NODE=S049S4

NODE=S049S4

NODE=S049S4

NODE=S049S4;LINKAGE=IW

NODE=S049S5

NODE=S049S5

NODE=S049S5

NODE=S049S5;LINKAGE=B

NODE=S049S5;LINKAGE=A

$\Gamma(s\ell^+\ell^-)/\Gamma_{\text{total}}$ Test for  $\Delta B = 1$  weak neutral current.

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.5 ± 1.0 OUR AVERAGE</b>			
$4.11 \pm 0.83^{+0.85}_{-0.81}$	<sup>1</sup> IWASAKI	05 BELL	$e^+ e^- \rightarrow \gamma(4S)$
$5.6 \pm 1.5 \pm 1.3$	<sup>2</sup> AUBERT,B	04I BABR	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$6.1 \pm 1.4^{+1.4}_{-1.1}$	<sup>2</sup> KANEKO	03 BELL	Repl. by IWASAKI 05

<sup>1</sup> Requires  $M_{\ell^+\ell^-} > 0.2 \text{ GeV}/c^2$ .<sup>2</sup> Requires  $M_{e^+e^-} > 0.2 \text{ GeV}/c^2$ . $\Gamma_{121}/\Gamma$ 

NODE=S049R72  
 NODE=S049R72  
 NODE=S049R72

 $\Gamma(\pi\ell^+\ell^-)/\Gamma_{\text{total}}$  $\Gamma_{122}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.2 \times 10^{-8}$	90	<sup>1</sup> WEI	08A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				

 $<9.1 \times 10^{-8}$ <sup>1</sup> AUBERT07AG BABR  $e^+ e^- \rightarrow \gamma(4S)$ <sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

NODE=S049R72;LINKAGE=IW  
 NODE=S049R72;LINKAGE=KN

 $\Gamma(K e^+ e^-)/\Gamma_{\text{total}}$  $\Gamma_{123}/\Gamma$ Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>4.4±0.6 OUR AVERAGE</b>				
$3.9^{+0.9}_{-0.8} \pm 0.2$		<sup>1</sup> AUBERT	09T BABR	$e^+ e^- \rightarrow \gamma(4S)$
$4.8^{+0.8}_{-0.7} \pm 0.3$		<sup>1</sup> WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.3^{+0.9}_{-0.8} \pm 0.2$		<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
$7.4^{+1.8}_{-1.6} \pm 0.5$		<sup>1</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J
$4.8^{+1.5}_{-1.3} \pm 0.3$		<sup>1,2</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A
$<13$	90	ABE	02 BELL	Repl. by ISHIKAWA 03

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .<sup>2</sup> The second error is a total of systematic uncertainties including model dependence.

NODE=S049R78  
 NODE=S049R78

 $\Gamma(K^*(892)e^+e^-)/\Gamma_{\text{total}}$  $\Gamma_{124}/\Gamma$ Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>11.9±2.0 OUR AVERAGE</b>				
Error includes scale factor of 1.2.				
$9.9^{+2.3}_{-2.1} \pm 0.6$		<sup>1</sup> AUBERT	09T BABR	$e^+ e^- \rightarrow \gamma(4S)$
$13.9^{+2.3}_{-2.0} \pm 1.2$		<sup>1</sup> WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$9.7^{+3.0}_{-2.7} \pm 1.4$		<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
$9.8^{+5.0}_{-4.2} \pm 1.1$		<sup>1</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J
$14.9^{+5.2}_{-4.6} \pm 1.2$		<sup>2</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A
$<56$	90	ABE	02 BELL	Repl. by ISHIKAWA 03

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ . The second error is a total of systematic uncertainties including model dependence.

NODE=S049R57;LINKAGE=EP  
 NODE=S049R57;LINKAGE=IS

 $\Gamma(K\mu^+\mu^-)/\Gamma_{\text{total}}$  $\Gamma_{125}/\Gamma$ Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.4±0.4 OUR AVERAGE</b>			
$4.2 \pm 0.4 \pm 0.2$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$4.1^{+1.3}_{-1.2} \pm 0.2$	<sup>1</sup> AUBERT	09T BABR	$e^+ e^- \rightarrow \gamma(4S)$
$5.0 \pm 0.6 \pm 0.3$	<sup>1</sup> WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

NODE=S049R59  
 NODE=S049R59

NODE=S049R59

• • • We do not use the following data for averages, fits, limits, etc. • • •

$3.5^{+1.3}_{-1.1} \pm 0.3$	<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
$4.5^{+2.3}_{-1.9} \pm 0.4$	<sup>1</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J
$4.8^{+1.2}_{-1.1} \pm 0.4$	<sup>1,2</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A
$9.9^{+4.0}_{-3.2} \pm 1.0$	ABE	02 BELL	Repl. by ISHIKAWA 03

1 Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

2 The second error is a total of systematic uncertainties including model dependence.

### $\Gamma(K\mu^+\mu^-)/\Gamma(Ke^+e^-)$ $\Gamma_{125}/\Gamma_{123}$

VALUE	DOCUMENT ID	TECN	COMMENT
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#### **$1.01 \pm 0.15$ OUR AVERAGE**

[ $1.02 \pm 0.18$  OUR 2012 AVERAGE]

$1.00^{+0.31}_{-0.25} \pm 0.07$	<sup>1</sup> LEES	12S BABR	$e^+e^- \rightarrow \gamma(4S)$
$0.96^{+0.44}_{-0.34} \pm 0.05$	AUBERT	09T BABR	$e^+e^- \rightarrow \gamma(4S)$
$1.03 \pm 0.19 \pm 0.06$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.06 \pm 0.48 \pm 0.08$	AUBERT,B	06J BABR	Repl. by AUBERT 09T
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1 Measured in the union of  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$  and  $q^2 > 10.11 \text{ GeV}^2/c^4$ .

LEES 12S reports also individual measurements  $\Gamma(B \rightarrow K\mu^+\mu^-)/\Gamma(B \rightarrow Ke^+e^-)$

$= 0.74^{+0.40}_{-0.31} \pm 0.06$  for  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$  and  $\Gamma(B \rightarrow K\mu^+\mu^-)/\Gamma(B \rightarrow$

$Ke^+e^-) = 1.43^{+0.65}_{-0.44} \pm 0.12$  for  $q^2 > 10.11 \text{ GeV}^2/c^4$ .

NODE=S049R59;LINKAGE=EP

NODE=S049R59;LINKAGE=IS

NODE=S049R76

NODE=S049R76

NEW

### $\Gamma(K^*(892)\mu^+\mu^-)/\Gamma_{\text{total}}$ $\Gamma_{126}/\Gamma$

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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#### **$10.6 \pm 0.9$ OUR AVERAGE**

$10.1 \pm 1.0 \pm 0.5$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$13.5^{+3.5}_{-3.3} \pm 1.0$	<sup>1</sup> AUBERT	09T BABR	$e^+e^- \rightarrow \gamma(4S)$
$11.0^{+1.6}_{-1.4} \pm 0.8$	<sup>1</sup> WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$8.8^{+3.5}_{-3.0} \pm 1.2$	<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
$12.7^{+7.6}_{-6.1} \pm 1.6$	<sup>1</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J
$11.7^{+3.6}_{-3.1} \pm 1.0$	<sup>2</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A

$<31$	90	ABE	02 BELL	Repl. by ISHIKAWA 03
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1 Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

2 Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ . The second error is a total of systematic uncertainties including model dependence.

NODE=S049R60

NODE=S049R60

NODE=S049R60

### $\Gamma(K^*(892)\mu^+\mu^-)/\Gamma(K^*(892)e^+e^-)$ $\Gamma_{126}/\Gamma_{124}$

VALUE	DOCUMENT ID	TECN	COMMENT
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#### **$0.98 \pm 0.15$ OUR AVERAGE**

[ $0.92 \pm 0.21$  OUR 2012 AVERAGE Scale factor = 1.2]

$1.13^{+0.34}_{-0.26} \pm 0.10$	<sup>1</sup> LEES	12S BABR	$e^+e^- \rightarrow \gamma(4S)$
$1.37^{+0.53}_{-0.40} \pm 0.09$	AUBERT	09T BABR	$e^+e^- \rightarrow \gamma(4S)$
$0.83 \pm 0.17 \pm 0.08$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.91 \pm 0.45 \pm 0.06$	AUBERT,B	06J BABR	Repl. by AUBERT 09T
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1 Measured in the union of  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$  and  $q^2 > 10.11 \text{ GeV}^2/c^4$ .

LEES 12S reports also individual measurements  $\Gamma(B \rightarrow K^*(892)\mu^+\mu^-)/\Gamma(B \rightarrow$

$K^*(892)e^+e^-) = 1.06^{+0.48}_{-0.33} \pm 0.08$  for  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$  and  $\Gamma(B \rightarrow$

$K^*(892)\mu^+\mu^-)/\Gamma(B \rightarrow K^*(892)e^+e^-) = 1.18^{+0.55}_{-0.37} \pm 0.11$  for  $q^2 > 10.11 \text{ GeV}^2/c^4$ .

NODE=S049R77

NODE=S049R77

NEW

NODE=S049R77;LINKAGE=EP

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$\Gamma(K\ell^+\ell^-)/\Gamma_{\text{total}}$  $\Gamma_{127}/\Gamma$ 

Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**4.8±0.4 OUR AVERAGE**

$[(4.5 \pm 0.4) \times 10^{-7}$  OUR 2012 AVERAGE]

4.7±0.6±0.2	LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$	
4.8 $^{+0.5}_{-0.4}$ ±0.3	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.9±0.7±0.2	<sup>1</sup> AUBERT	09T BABR	Repl. by LEES 12S	
3.4±0.7±0.2	<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T	
6.5 $^{+1.4}_{-1.3}$ ±0.4	<sup>2</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J	
4.8 $^{+1.0}_{-0.9}$ ±0.3	<sup>3</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A	
7.5 $^{+2.5}_{-2.1}$ ±0.6	<sup>4</sup> ABE	02 BELL	Repl. by ISHIKAWA 03	
< 5.1	90	<sup>1</sup> AUBERT	02L BABR	$e^+ e^- \rightarrow \gamma(4S)$
<17	90	<sup>5</sup> ANDERSON	01B CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Assumes all four  $B \rightarrow K\ell^+\ell^-$  modes having equal partial widths in the fit.

<sup>3</sup> Assumes equal production rate for charge and neutral  $B$  meson pairs, isospin invariance, lepton universality for  $B \rightarrow K\ell^+\ell^-$ , and  $B(B \rightarrow K^*(892)\mu^+\mu^-) = 1.33$ . The second error is total systematic uncertainties including model dependence.

<sup>4</sup> Assumes lepton universality.

<sup>5</sup> The result is for di-lepton masses above 0.5 GeV.

 $\Gamma(K^*(892)\ell^+\ell^-)/\Gamma_{\text{total}}$  $\Gamma_{128}/\Gamma$ 

Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**10.5±1.0 OUR AVERAGE**

$[(10.8 \pm 1.1) \times 10^{-7}$  OUR 2012 AVERAGE]

10.2 $^{+1.4}_{-1.3}$ ±0.5	LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$	
10.7 $^{+1.1}_{-1.0}$ ±0.9	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
11.1 $^{+1.9}_{-1.8}$ ±0.7	<sup>1</sup> AUBERT	09T BABR	Repl. by LEES 12S	
7.8 $^{+1.9}_{-1.7}$ ±1.1	<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T	
8.8 $^{+3.3}_{-2.9}$ ±1.0	<sup>2</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J	
11.5 $^{+2.6}_{-2.4}$ ±0.8	<sup>3</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A	
<31	90	<sup>1,4</sup> AUBERT	02L BABR	Repl. by AUBERT 03U
<33	90	<sup>5</sup> ANDERSON	01B CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Assumes the partial width ratio of electron and muon modes to be  $\Gamma(B \rightarrow K^*(892)e^+e^-)/\Gamma(B \rightarrow K^*(892)\mu^+\mu^-) = 1.33$ .

<sup>3</sup> Assumes equal production rate for charge and neutral  $B$  meson pairs, isospin invariance, lepton universality for  $B \rightarrow K\ell^+\ell^-$ , and  $B(B \rightarrow K^*(892)\mu^+\mu^-) = 1.33$ . The second error is total systematic uncertainties including model dependence.

<sup>4</sup> For averaging  $K^*(892)\mu^+\mu^-$  and  $K^*(892)e^+e^-$  modes, AUBERT 02L assumed  $B(B \rightarrow K^*(892)e^+e^-)/B(B \rightarrow K^*(892)\mu^+\mu^-) = 1.2$ .

<sup>5</sup> The result is for di-lepton masses above 0.5 GeV.

 $\Gamma(K\nu\bar{\nu})/\Gamma_{\text{total}}$  $\Gamma_{129}/\Gamma$ 

Test for  $\Delta B = 1$  weak neutral current.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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**<1.4 × 10<sup>-5</sup>** 90 <sup>1</sup>DEL-AMO-SA...10Q BABR  $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K^*\nu\bar{\nu})/\Gamma_{\text{total}}$  $\Gamma_{130}/\Gamma$ 

Test for  $\Delta B = 1$  weak neutral current.

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**<8** 90 AUBERT 08BC BABR  $e^+ e^- \rightarrow \gamma(4S)$

NODE=S049R61

NODE=S049R61

NODE=S049R61

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NODE=S049R62

NEW

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NODE=S049R62;LINKAGE=AU

NODE=S049R62;LINKAGE=IK

NODE=S049R62;LINKAGE=H3

NODE=S049R62;LINKAGE=A

NODE=S049R83

NODE=S049R83

NODE=S049R83

NODE=S049R83;LINKAGE=EP

NODE=S049R79

NODE=S049R79

NODE=S049R79

$\Gamma(se^\pm \mu^\mp)/\Gamma_{\text{total}}$  $\Gamma_{131}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.2 \times 10^{-5}$	90	GLENN	98	CLEO $e^+ e^- \rightarrow \gamma(4S)$

 $\Gamma(\pi e^\pm \mu^\mp)/\Gamma_{\text{total}}$  $\Gamma_{132}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<9.2 \times 10^{-8}$	90	1 AUBERT	07AG BABR	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.6 \times 10^{-6}$	90	1 EDWARDS	02B CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(\rho e^\pm \mu^\mp)/\Gamma_{\text{total}}$  $\Gamma_{133}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.2 \times 10^{-6}$	90	1 EDWARDS	02B CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K e^\pm \mu^\mp)/\Gamma_{\text{total}}$  $\Gamma_{134}/\Gamma$ 

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$< 0.38$	90	1 AUBERT,B	06J BABR	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<16$	90	1 EDWARDS	02B CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K^*(892) e^\pm \mu^\mp)/\Gamma_{\text{total}}$  $\Gamma_{135}/\Gamma$ 

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$< 5.1$	90	1 AUBERT,B	06J BABR	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<62$	90	1 EDWARDS	02B CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

**CP VIOLATION**

$A_{CP}$  is defined as

$$\frac{B(\bar{B} \rightarrow \bar{f}) - B(B \rightarrow f)}{B(\bar{B} \rightarrow \bar{f}) + B(B \rightarrow f)},$$

the CP-violation charge asymmetry of inclusive  $B^\pm$  and  $B^0$  decay.

 $A_{CP}(B \rightarrow K^*(892)\gamma)$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.003 \pm 0.017</math> OUR AVERAGE</b>			
$-0.003 \pm 0.017 \pm 0.007$	1 AUBERT	09AO BABR	$e^+ e^- \rightarrow \gamma(4S)$
$-0.015 \pm 0.044 \pm 0.012$	2 NAKAO	04 BELL	$e^+ e^- \rightarrow \gamma(4S)$
$+0.08 \pm 0.13 \pm 0.03$	2 COAN	00 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$-0.013 \pm 0.036 \pm 0.010$	3 AUBERT,BE	04A BABR	Repl. by AUBERT 09AO
$-0.044 \pm 0.076 \pm 0.012$	4 AUBERT	02C BABR	Repl. by AUBERT,BE 04A

<sup>1</sup> Corresponds to a 90% CL interval  $-0.033 < A_{CP} < 0.028$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>3</sup> Corresponds to a 90% CL allowed region,  $-0.074 < A_{CP} < 0.049$ .

<sup>4</sup> A 90% CL range is  $-0.170 < A_{CP} < 0.082$ .

NODE=S049R33

NODE=S049R33

NODE=S049R33

NODE=S049R67

NODE=S049R67

NODE=S049R67

NODE=S049R67;LINKAGE=EP

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NODE=S049CP1

NODE=S049CP1;LINKAGE=AE

NODE=S049CP1;LINKAGE=EP

NODE=S049CP1;LINKAGE=AU

NODE=S049CP1;LINKAGE=C7

**$A_{CP}(b \rightarrow s\gamma)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.008±0.029 OUR AVERAGE</b>			

-0.011±0.030±0.014	1 AUBERT	08BJ BABR	$e^+ e^- \rightarrow \gamma(4S)$
0.002±0.050±0.030	2 NISHIDA	04 BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.025±0.050±0.015	<sup>3</sup> AUBERT,B	04E BABR	Repl. by AUBERT 08BJ
1 Uses a sum of exclusively reconstructed $B \rightarrow X_s$ decay modes, with $X_s$ mass between 0.6 and 2.8 $\text{GeV}/c^2$ .			
2 This measurement is performed inclusively for recoil mass $X_s$ less than 2.1 GeV, which corresponds to $-0.093 < A_{CP} < 0.096$ at 90% CL.			
3 Corresponds to $-0.06 < A_{CP} < 0.11$ at 90% CL.			

 **$A_{CP}(b \rightarrow (s+d)\gamma)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.01 ±0.05 OUR AVERAGE</b>			

[ $-0.09 \pm 0.07$  OUR 2012 AVERAGE]

0.057±0.060±0.018	LEES	12V BABR	$e^+ e^- \rightarrow \gamma(4S)$
-0.10 ±0.18 ±0.05	<sup>1</sup> AUBERT	080 BABR	$e^+ e^- \rightarrow \gamma(4S)$
-0.110±0.115±0.017	AUBERT,BE	06B BABR	$e^+ e^- \rightarrow \gamma(4S)$
-0.079±0.108±0.022	COAN	01 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

1 Uses a fully reconstructed  $B$  meson as a tag on the recoil side. Requires  $E_\gamma > 2.2$  GeV.2 Corresponds to  $-0.27 < A_{CP} < 0.10$  at 90% CL. **$A_{CP}(B \rightarrow X_s \ell^+ \ell^-)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.22±0.26±0.02</b>			

1 The final state flavor is determined by the kaon and pion charges where modes with  $X_s = K_S^0, K_S^0 \pi^0$  or  $K_S^0 \pi^+ \pi^-$  are not used. **$A_{CP}(B \rightarrow K^* e^+ e^-)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.18±0.15±0.01</b>			

 **$A_{CP}(B \rightarrow K^* \mu^+ \mu^-)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.03±0.13±0.02</b>			

 **$A_{CP}(B \rightarrow K^* \ell^+ \ell^-)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.04±0.07 OUR AVERAGE</b>			

[ $-0.07 \pm 0.08$  OUR 2012 AVERAGE]

0.03±0.13±0.01	<sup>1</sup> LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
+0.01 <sup>+0.16</sup> <sub>-0.15</sub> ±0.01	AUBERT	09T BABR	$e^+ e^- \rightarrow \gamma(4S)$
-0.10±0.10±0.01	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

1 Measured in the union of  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$  and  $q^2 > 10.11 \text{ GeV}^2/c^4$ . LEES 12S reports also individual measurements  $A_{CP}(B \rightarrow K^* \ell^+ \ell^-) = -0.13^{+0.18}_{-0.19} \pm 0.01$  for  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$  and  $A_{CP}(B \rightarrow K^* \ell^+ \ell^-) = 0.16^{+0.18}_{-0.19} \pm 0.01$  for  $q^2 > 10.11 \text{ GeV}^2/c^4$ . **$A_{CP}(B \rightarrow \eta \text{anything})$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.13±0.04<sup>+0.02</sup><sub>-0.03</sub></b>			

1 Uses  $B \rightarrow \eta X_s$  with  $0.4 < m_{X_s} < 2.6 \text{ GeV}/c^2$ .

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NODE=S049CP2;LINKAGE=AU

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NODE=S049CP5

NEW

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NODE=S049CP8

NODE=S049CP8

NODE=S049CP8;LINKAGE=NI

## POLARIZATION IN $B$ DECAY

In decays involving two vector mesons, one can distinguish among the states in which meson polarizations are both longitudinal ( $L$ ) or both are transverse and parallel ( $\parallel$ ) or perpendicular ( $\perp$ ) to each other with the parameters  $\Gamma_L/\Gamma$ ,  $\Gamma_\perp/\Gamma$ , and the relative phases  $\phi_\parallel$  and  $\phi_\perp$ . See the definitions in the note on “Polarization in  $B$  Decays” review in the  $B^0$  Particle Listings.

### $F_L(B \rightarrow K^* \ell^+ \ell^-) (q^2 > 0.1 \text{ GeV}^2/c^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.63^{+0.18}_{-0.19} \pm 0.05$	<sup>1</sup> AUBERT,B	06J BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Results with different  $q^2$  cuts are also reported.

### $F_L(B \rightarrow K^* \ell^+ \ell^-) (m_{\ell\ell} < 2.5 \text{ GeV}/c^2)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.35 \pm 0.16 \pm 0.04$	AUBERT	09N BABR	$e^+ e^- \rightarrow \gamma(4S)$

### $F_L(B \rightarrow K^* \ell^+ \ell^-) (m_{\ell\ell} > 3.2 \text{ GeV}/c^2)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.71^{+0.20}_{-0.22} \pm 0.04$	AUBERT	09N BABR	$e^+ e^- \rightarrow \gamma(4S)$

### $F_L(B \rightarrow K^* \ell^+ \ell^-) (q^2 < 2.0 \text{ GeV}^2/c^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.159 $^{+0.110}_{-0.023}$  OUR AVERAGE** Error includes scale factor of 1.2. [ $0.35 \pm 0.17$  OUR 2012 AVERAGE]

0.00 $^{+0.13}_{-0.00}$ $\pm 0.02$	AAIJ	12U LHCb	$p p$ at 7 TeV
0.30 $\pm 0.16$ $\pm 0.02$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.29 $^{+0.21}_{-0.18}$ $\pm 0.02$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.53 $^{+0.32}_{-0.34}$ $\pm 0.07$	AALTONEN	11L CDF	Repl. by AALTONEN 12I
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### $F_L(B \rightarrow K^* \ell^+ \ell^-) (2.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.68 $\pm 0.12$  OUR AVERAGE**

[ $0.60 \pm 0.20$  OUR 2012 AVERAGE]

0.77 $\pm 0.15 \pm 0.03$	AAIJ	12U LHCb	$p p$ at 7 TeV
0.37 $^{+0.25}_{-0.24} \pm 0.10$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.71 $\pm 0.24 \pm 0.05$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.40 $^{+0.32}_{-0.33} \pm 0.08$	AALTONEN	11L CDF	Repl. by AALTONEN 12I
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### $F_L(B \rightarrow K^* \ell^+ \ell^-) (4.3 < q^2 < 8.6 \text{ GeV}^2/c^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.61 $\pm 0.06$  OUR AVERAGE**

[ $0.74^{+0.15}_{-0.17}$  OUR 2012 AVERAGE]

0.60 $^{+0.06}_{-0.07} \pm 0.01$	AAIJ	12U LHCb	$p p$ at 7 TeV
0.68 $^{+0.15}_{-0.17} \pm 0.09$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.64 $^{+0.23}_{-0.24} \pm 0.07$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.82 $^{+0.19}_{-0.23} \pm 0.07$	AALTONEN	11L CDF	Repl. by AALTONEN 12I
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### $F_L(B \rightarrow K^* \ell^+ \ell^-) (10.09 < q^2 < 12.86 \text{ GeV}^2/c^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.38 $\pm 0.08$  OUR AVERAGE**

[ $0.23 \pm 0.12$  OUR 2012 AVERAGE]

0.41 $\pm 0.11 \pm 0.03$	AAIJ	12U LHCb	$p p$ at 7 TeV
0.47 $\pm 0.14 \pm 0.03$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.17 $^{+0.17}_{-0.15} \pm 0.03$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.31 $^{+0.19}_{-0.18} \pm 0.02$	AALTONEN	11L CDF	Repl. by AALTONEN 12I
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NODE=S049224

NODE=S049224

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NODE=S049FL

NODE=S049FL;LINKAGE=AU

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NODE=S049FL1

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NODE=S049FL2

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NODE=S049FL3

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NODE=S049FL4  
NEW

NODE=S049FL5  
NODE=S049FL5  
NEW

NODE=S049FL6  
NODE=S049FL6  
NEW

**$F_L(B \rightarrow K^* \ell^+ \ell^-)$  ( $14.18 < q^2 < 16.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.30±0.10 OUR AVERAGE</b>			Error includes scale factor of 1.2. [0.34 ± 0.31 OUR 2012 AVERAGE Scale factor = 2.1]
0.37±0.09±0.05	AAIJ	12U	LHCb $p\bar{p}$ at 7 TeV
0.29 <sup>+0.14</sup> <sub>-0.13</sub> ±0.05	AALTENON	12I	CDF $p\bar{p}$ at 1.96 TeV
-0.15 <sup>+0.27</sup> <sub>-0.23</sub> ±0.07	WEI	09A	BELL $e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.55 <sup>+0.17</sup> <sub>-0.18</sub> ±0.02	AALTENON	11L	CDF Repl. by AALTENON 12I

NODE=S049FL7

NODE=S049FL7

NEW

 **$F_L(B \rightarrow K^* \ell^+ \ell^-)$  ( $q^2 > 16.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.22<sup>+0.08</sup><sub>-0.07</sub> OUR AVERAGE</b>			
[0.11 <sup>+0.12</sup> <sub>-0.10</sub> OUR 2012 AVERAGE]			
0.26 <sup>+0.10</sup> <sub>-0.08</sub> ±0.03	AAIJ	12U	LHCb $p\bar{p}$ at 7 TeV
0.20 <sup>+0.19</sup> <sub>-0.17</sub> ±0.05	AALTENON	12I	CDF $p\bar{p}$ at 1.96 TeV
0.12 <sup>+0.15</sup> <sub>-0.13</sub> ±0.02	WEI	09A	BELL $e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.09 <sup>+0.18</sup> <sub>-0.14</sub> ±0.03	AALTENON	11L	CDF Repl. by AALTENON 12I

NODE=S049FL8

NODE=S049FL8

NEW

 **$F_L(B \rightarrow K^* \ell^+ \ell^-)$  ( $1.0 < q^2 < 6.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.59±0.09 OUR AVERAGE</b>			
[0.60 ± 0.18 OUR 2012 AVERAGE]			
0.55±0.10±0.03	AAIJ	12U	LHCb $p\bar{p}$ at 7 TeV
0.69 <sup>+0.19</sup> <sub>-0.21</sub> ±0.08	AALTENON	12I	CDF $p\bar{p}$ at 1.96 TeV
0.67±0.23±0.05	WEI	09A	BELL $e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.50 <sup>+0.27</sup> <sub>-0.30</sub> ±0.03	AALTENON	11L	CDF Repl. by AALTENON 12I

NODE=S049FL9

NODE=S049FL9

NEW

 **$F_L(B \rightarrow K^* \ell^+ \ell^-)$  ( $0.0 < q^2 < 4.3 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.33±0.14 OUR AVERAGE</b>			[0.47 ± 0.24 OUR 2012 AVERAGE]
<b>0.33<sup>+0.14</sup><sub>-0.13</sub>±0.03</b>	AALTENON	12I	CDF $p\bar{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.47 <sup>+0.23</sup> <sub>-0.24</sub> ±0.03	AALTENON	11L	CDF Repl. by AALTENON 12I

NODE=S049FLA

NODE=S049FLA

NEW

**PARTIAL BRANCHING FRACTIONS IN  $B \rightarrow K^{(*)} \ell^+ \ell^-$**  **$B(B \rightarrow K^* \ell^+ \ell^-)$  ( $q^2 < 2.0 \text{ GeV}^2/c^4$ )**

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.68±0.23 OUR AVERAGE</b>			
[ $(1.61 \pm 0.26) \times 10^{-7}$ OUR 2012 AVERAGE]			
1.89 <sup>+0.52</sup> <sub>-0.46</sub> ±0.06	<sup>1</sup> LEES	12S	BABR $e^+ e^- \rightarrow \gamma(4S)$
1.73±0.33±0.10	AALTENON	11AI	CDF $p\bar{p}$ at 1.96 TeV
1.46 <sup>+0.40</sup> <sub>-0.35</sub> ±0.11	WEI	09A	BELL $e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.98±0.40±0.09	AALTENON	11L	CDF Repl. by AALTENON 11AI

NODE=S049223

NODE=S049PB1

NODE=S049PB1

NEW

<sup>1</sup>The value reported here from LEES 12S refers to  $0.1 < q^2 < 2.0 \text{ GeV}^2/c^2$ .

NODE=S049PB1;LINKAGE=LE

**$B(B \rightarrow K^* \ell^+ \ell^-) (2.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$** 

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>0.87 \pm 0.17</math> OUR AVERAGE</b>			
[( $0.84 \pm 0.20$ ) $\times 10^{-7}$ OUR 2012 AVERAGE]			
$0.95^{+0.35}_{-0.30} \pm 0.04$	LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$0.82 \pm 0.26 \pm 0.06$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$0.86^{+0.31}_{-0.27} \pm 0.07$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.00 \pm 0.38 \pm 0.09$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

NODE=S049PB2

NODE=S049PB2

NEW

 **$B(B \rightarrow K^* \ell^+ \ell^-) (4.3 < q^2 < 8.68 \text{ GeV}^2/c^4)$** 

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.67 \pm 0.29</math> OUR AVERAGE</b>			
[( $1.60 \pm 0.35$ ) $\times 10^{-7}$ OUR 2012 AVERAGE]			
$1.82^{+0.56}_{-0.52} \pm 0.09$	<sup>1</sup> LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$1.72 \pm 0.41 \pm 0.14$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$1.37^{+0.47}_{-0.42} \pm 0.39$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.69 \pm 0.57 \pm 0.15$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

NODE=S049PB3

NODE=S049PB3

NEW

 **$B(B \rightarrow K^* \ell^+ \ell^-) (10.09 < q^2 < 12.86 \text{ GeV}^2/c^4)$** 

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.93 \pm 0.25</math> OUR AVERAGE</b>			
[( $1.95 \pm 0.28$ ) $\times 10^{-7}$ OUR 2012 AVERAGE]			
$1.86^{+0.52}_{-0.48} \pm 0.10$	<sup>1</sup> LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$1.77 \pm 0.34 \pm 0.11$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$2.24^{+0.44}_{-0.40} \pm 0.19$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.97 \pm 0.47 \pm 0.17$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

1 The value reported here from LEES 12S refers to  $4.3 < q^2 < 8.12 \text{ GeV}^2/c^2$ .

NODE=S049PB3;LINKAGE=LE

NODE=S049PB4

NODE=S049PB4

NEW

 **$B(B \rightarrow K^* \ell^+ \ell^-) (14.18 < q^2 < 16.0 \text{ GeV}^2/c^4)$** 

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.21 \pm 0.17</math> OUR AVERAGE</b>			
[( $1.14 \pm 0.19$ ) $\times 10^{-7}$ OUR 2012 AVERAGE]			
$1.46^{+0.41}_{-0.36} \pm 0.06$	<sup>1</sup> LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$1.21 \pm 0.24 \pm 0.07$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$1.05^{+0.29}_{-0.26} \pm 0.08$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.51 \pm 0.36 \pm 0.13$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

1 The value reported here from LEES 12S refers to  $10.11 < q^2 < 12.89 \text{ GeV}^2/c^2$ .

NODE=S049PB4;LINKAGE=LE

NODE=S049PB5

NODE=S049PB5

NEW

 **$B(B \rightarrow K^* \ell^+ \ell^-) (16.0 < q^2 \text{ GeV}^2/c^4)$** 

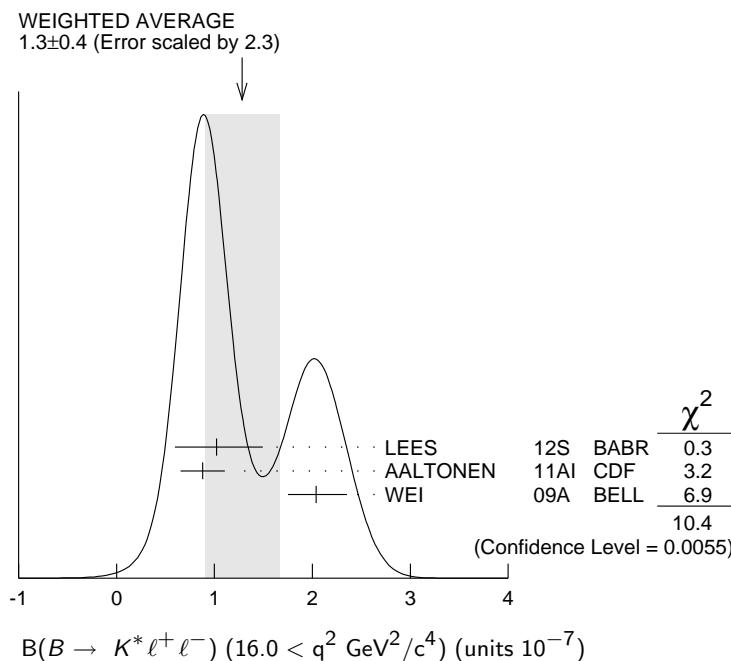
VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.3 \pm 0.4</math> OUR AVERAGE</b>			Error includes scale factor of 2.3. See the ideogram below.
[( $1.3 \pm 0.6$ ) $\times 10^{-7}$ OUR 2012 AVERAGE Scale factor = 3.2]			
$1.02^{+0.47}_{-0.42} \pm 0.06$	LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$0.88 \pm 0.22 \pm 0.05$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$2.04^{+0.27}_{-0.24} \pm 0.16$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.35 \pm 0.37 \pm 0.12$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

NODE=S049PB5;LINKAGE=LE

NODE=S049PB6

NODE=S049PB6

NEW



$B(B \rightarrow K^* \ell^+ \ell^-) (16.0 < q^2 \text{ GeV}^2/c^4) (\text{units } 10^{-7})$

### $B(B \rightarrow K^* \ell^+ \ell^-) (1.0 < q^2 < 6.0 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.64±0.26 OUR AVERAGE</b>			
[(1.48 ± 0.30) × $10^{-7}$ OUR 2012 AVERAGE]			
2.05 <sup>+0.53</sup> <sub>-0.48</sub> ±0.07	LEES	12S   BABR	$e^+ e^- \rightarrow \gamma(4S)$
1.48±0.39±0.12	AALTONEN	11AI   CDF	$p\bar{p}$ at 1.96 TeV
1.49 <sup>+0.45</sup> <sub>-0.40</sub> ±0.12	WEI	09A   BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.60±0.54±0.14	AALTONEN	11L   CDF	Repl. by AALTONEN 11AI

NODE=S049PB7

NODE=S049PB7

NEW

### $B(B \rightarrow K^* \ell^+ \ell^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.53±0.43±0.15</b>			
AALTONEN    11AI   CDF $p\bar{p}$ at 1.96 TeV			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.98±0.55±0.18	AALTONEN	11L   CDF	Repl. by AALTONEN 11AI

NODE=S049PB8

NODE=S049PB8

### $B(B \rightarrow K \ell^+ \ell^-) (q^2 < 2.0 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.51±0.16 OUR AVERAGE</b>			
Error includes scale factor of 1.9. See the ideogram below. [(0.46 ± 0.22) × $10^{-7}$ OUR 2012 AVERAGE Scale factor = 2.4]			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.71 <sup>+0.20</sup> <sub>-0.18</sub> ±0.02	<sup>1</sup> LEES	12S   BABR	$e^+ e^- \rightarrow \gamma(4S)$
0.33±0.10±0.02	AALTONEN	11AI   CDF	$p\bar{p}$ at 1.96 TeV
0.81 <sup>+0.18</sup> <sub>-0.16</sub> ±0.05	WEI	09A   BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.38±0.16±0.03	AALTONEN	11L   CDF	Repl. by AALTONEN 11AI

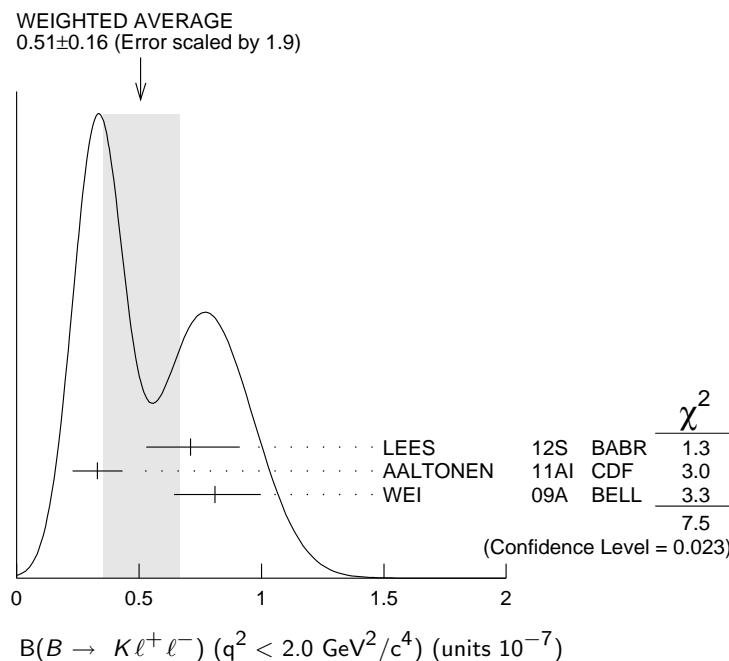
NODE=S049PB9

NODE=S049PB9

NEW

<sup>1</sup> The value reported here from LEES 12S refers to  $0.1 < q^2 < 2.0 \text{ GeV}^2/c^2$ .

NODE=S049PB9;LINKAGE=LE



### $B(B \rightarrow K\ell^+\ell^-) (2.0 < q^2 < 4.3 \text{ GeV}^2/\text{c}^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
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**0.57<sup>+0.10</sup><sub>-0.09</sub> OUR AVERAGE** Error includes scale factor of 1.2.  $[(0.61 \pm 0.15) \times 10^{-7}]$

OUR 2012 AVERAGE Scale factor = 1.5]

$0.49^{+0.15}_{-0.13} \pm 0.01$	LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$0.77 \pm 0.14 \pm 0.05$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$0.46^{+0.14}_{-0.12} \pm 0.03$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.58 \pm 0.19 \pm 0.04$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI
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NODE=S049PBA  
NODE=S049PBA

NEW

### $B(B \rightarrow K\ell^+\ell^-) (4.3 < q^2 < 8.68 \text{ GeV}^2/\text{c}^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
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**1.00<sup>+0.11</sup><sub>-0.11</sub> OUR AVERAGE**

$[(1.03 \pm 0.13) \times 10^{-7}$  OUR 2012 AVERAGE]

$0.94^{+0.20}_{-0.19} \pm 0.02$	<sup>1</sup> LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$1.05 \pm 0.17 \pm 0.07$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$1.00^{+0.19}_{-0.18} \pm 0.06$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.93 \pm 0.25 \pm 0.06$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI
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NODE=S049PBB  
NODE=S049PBB

NEW

<sup>1</sup> The value reported here from LEES 12S refers to  $4.3 < q^2 < 8.12 \text{ GeV}^2/\text{c}^2$ .

NODE=S049PBB;LINKAGE=LE

### $B(B \rightarrow K\ell^+\ell^-) (10.09 < q^2 < 12.86 \text{ GeV}^2/\text{c}^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
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**0.57<sup>+0.11</sup><sub>-0.11</sub> OUR AVERAGE** Error includes scale factor of 1.4. See the ideogram below.

$[(0.50 \pm 0.09) \times 10^{-7}$  OUR 2012 AVERAGE]

$0.90^{+0.20}_{-0.19} \pm 0.04$	<sup>1</sup> LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$0.48 \pm 0.10 \pm 0.03$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$0.55^{+0.16}_{-0.14} \pm 0.03$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

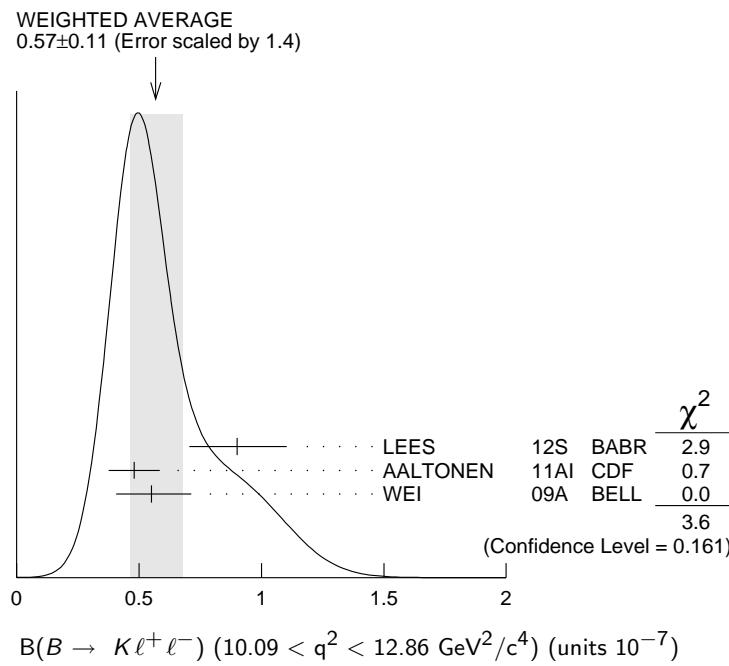
$0.72 \pm 0.17 \pm 0.05$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI
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NODE=S049PBC  
NODE=S049PBC

NEW

<sup>1</sup> The value reported here from LEES 12S refers to  $10.11 < q^2 < 12.89 \text{ GeV}^2/c^2$ .

NODE=S049PBC;LINKAGE=LE



### $B(B \rightarrow K\ell^+\ell^-) (14.18 < q^2 < 16.0 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
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**0.49 ± 0.07 OUR AVERAGE**

$[(0.49^{+0.08}_{-0.07}) \times 10^{-7}$  OUR 2012 AVERAGE]

$0.49^{+0.15}_{-0.14} \pm 0.02$	<sup>1</sup> LEES	12S BABR	$e^+e^- \rightarrow \gamma(4S)$
$0.52 \pm 0.09 \pm 0.03$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$0.38^{+0.19}_{-0.12} \pm 0.02$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.38 \pm 0.12 \pm 0.03$  AALTONEN 11L CDF Repl. by AALTONEN 11AI

<sup>1</sup> The value reported here from LEES 12S refers to  $14.21 < q^2 < 16.0 \text{ GeV}^2/c^2$ .

NODE=S049PBD

NODE=S049PBD

NEW

### $B(B \rightarrow K\ell^+\ell^-) (16.0 < q^2 < 17.0 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
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**0.52 ± 0.16 OUR AVERAGE** Error includes scale factor of 2.1. See the ideogram below.

$[(0.49 \pm 0.24) \times 10^{-7}$  OUR 2012 AVERAGE Scale factor = 2.8]

$0.67^{+0.23}_{-0.21} \pm 0.05$	LEES	12S BABR	$e^+e^- \rightarrow \gamma(4S)$
$0.38 \pm 0.09 \pm 0.02$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$0.98^{+0.20}_{-0.18} \pm 0.06$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

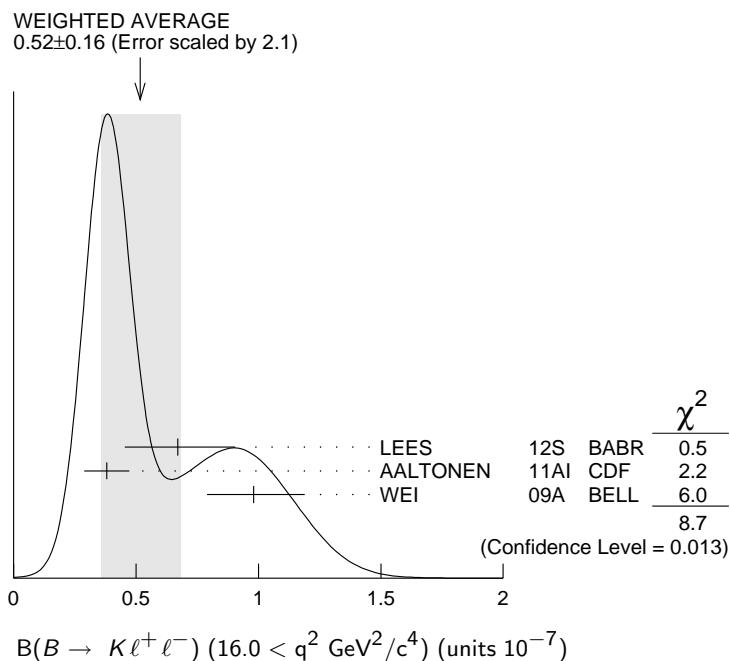
$0.35 \pm 0.13 \pm 0.02$  AALTONEN 11L CDF Repl. by AALTONEN 11AI

NODE=S049PBD;LINKAGE=LE

NODE=S049PBE

NODE=S049PBE

NEW



### $B(B \rightarrow K\ell^+\ell^-) (1.0 < q^2 < 6.0 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.33±0.13 OUR AVERAGE</b>			
[( $1.32 \pm 0.15$ ) $\times 10^{-7}$ OUR 2012 AVERAGE]			
$1.36^{+0.27}_{-0.24} \pm 0.03$	LEES	12S BABR	$e^+ e^- \rightarrow \gamma(4S)$
$1.29 \pm 0.18 \pm 0.08$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
$1.36^{+0.23}_{-0.21} \pm 0.08$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.01 \pm 0.26 \pm 0.07$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

NODE=S049PBF  
NODE=S049PBF

NEW

### $B(B \rightarrow K\ell^+\ell^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.07±0.17±0.07</b>			
AALTONEN 11AI CDF $p\bar{p}$ at 1.96 TeV			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.96 \pm 0.25 \pm 0.06$	AALTONEN	11L CDF	Repl. by AALTONEN 11AI

NODE=S049PBG  
NODE=S049PBG

## LEPTON FORWARD-BACKWARD ASYMMETRY IN $B \rightarrow K^{(*)}\ell^+\ell^-$ DECAY

The forward-backward angular asymmetry of the lepton pair in  $B \rightarrow K^{(*)}\ell^+\ell^-$  decay is defined as

$$A_{FB}(s) = \frac{N(\cos\theta>0) - N(\cos\theta<0)}{N(\cos\theta>0) + N(\cos\theta<0)},$$

where  $s=q^2/m_B^2$ , and  $\theta$  is the angle of the lepton with respect to the flight direction of the  $B$  meson, measured in the dilepton rest frame. In addition, the fraction of longitudinal polarization  $F_L$  of the  $K^*$  and  $F_S$ , the relative contribution from scalar and pseudoscalar penguin amplitudes in  $B \rightarrow K\ell^+\ell^-$ , can be measured from the angular distribution of its decay products.

### $A_{FB}(B \rightarrow K^*\ell^+\ell^-) (q^2 > 0.1 \text{ GeV}^2/c^4)$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.50±0.15±0.02</b>	1	ISHIKAWA	06 BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
>0.55	95	<sup>2</sup> AUBERT,B	06J BABR	$e^+ e^- \rightarrow \gamma(4S)$

NODE=S049220

NODE=S049220

NODE=S049FB1  
NODE=S049FB1

<sup>1</sup> Using an unbinned max. likelihood fits to the  $M_{bc}$  distribution in five  $q^2$  bins for  $\cos\theta>0$  and  $\cos\theta<0$ .

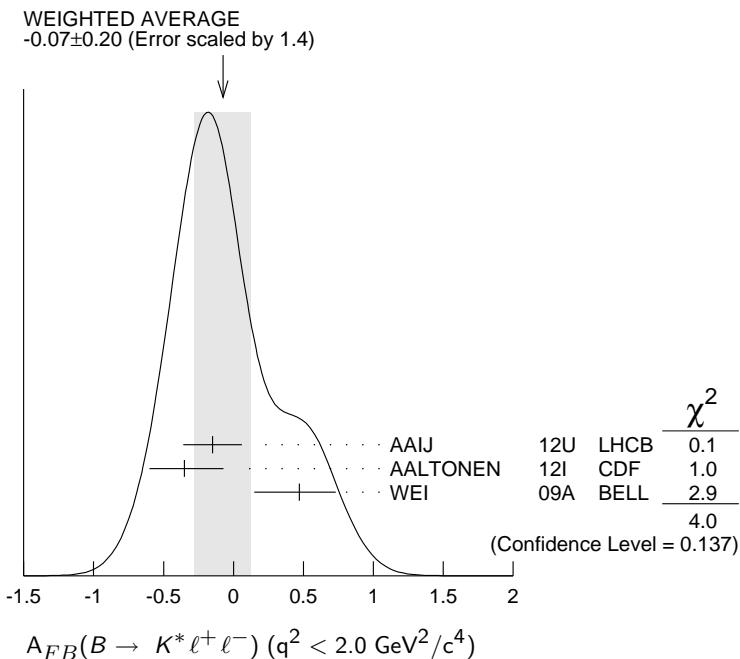
<sup>2</sup> Results with different  $q^2$  cuts are also reported.

NODE=S049FB1;LINKAGE=IS

NODE=S049FB1;LINKAGE=AU

**$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (q^2 < 2.0 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.07 ± 0.20 OUR AVERAGE</b>	Error includes scale factor of 1.4. See the ideogram below. [0.45 ± 0.26 OUR 2012 AVERAGE]		
-0.15 ± 0.20 ± 0.06	AAIJ	12U LHCb	$p p$ at 7 TeV
-0.35 ± 0.26 ± 0.10	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.47 ± 0.26 ± 0.03	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.13 ± 1.65 ± 0.25	AALTONEN	11L CDF	Repl. by AALTONEN 12I

 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (m_{\ell\ell} < 2.5 \text{ GeV}/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.24 ± 0.18 ± 0.05</b>	AUBERT		
AUBERT	09N BABR	$e^+ e^- \rightarrow \gamma(4S)$	

NODE=S049FB3  
NODE=S049FB3 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (m_{\ell\ell} > 3.2 \text{ GeV}/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.76 ± 0.52 ± 0.07</b>	AUBERT		
AUBERT	09N BABR	$e^+ e^- \rightarrow \gamma(4S)$	

NODE=S049FB4  
NODE=S049FB4 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (2.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
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NODE=S049FB6  
NODE=S049FB6**0.10 ± 0.14 OUR AVERAGE**

[0.14 ± 0.27 OUR 2012 AVERAGE]

0.05 ± 0.16 ± 0.04	AAIJ	12U LHCb	$p p$ at 7 TeV
0.29 ± 0.32 ± 0.15	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.11 ± 0.31 ± 0.07	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$

NEW

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.19 ± 0.40 ± 0.14 AALTONEN 11L CDF Repl. by AALTONEN 12I

 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.08 ± 0.21 OUR AVERAGE</b>	[0.21 ± 0.32 OUR 2012 AVERAGE]		

NODE=S049FBF  
NODE=S049FBF  
NEW-0.08 ± 0.21 ± 0.05 AALTONEN 12I CDF  $p\bar{p}$  at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.21 ± 0.31 ± 0.05 AALTONEN 11L CDF Repl. by AALTONEN 12I

**$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (1.0 < q^2 < 6.0 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.07 <math>\pm</math> 0.12 OUR AVERAGE</b>			
[0.32 $\pm$ 0.23 OUR 2012 AVERAGE]			
-0.06 $^{+0.13}_{-0.14}$ $\pm$ 0.07	AAIJ	12U LHCb	$p\bar{p}$ at 7 TeV
0.29 $^{+0.20}_{-0.23}$ $\pm$ 0.07	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.26 $^{+0.27}_{-0.30}$ $\pm$ 0.07	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.43 $^{+0.36}_{-0.37}$ $\pm$ 0.06	AALTONEN	11L CDF	Repl. by AALTONEN 12I

NODE=S049FBE

NODE=S049FBE

NEW

 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (4.3 < q^2 < 8.6 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.26 <math>\pm</math> 0.06 OUR AVERAGE</b>			
[0.24 $\pm$ 0.24 OUR 2012 AVERAGE Scale factor = 1.3]			
0.27 $^{+0.06}_{-0.08}$ $\pm$ 0.02	AAIJ	12U LHCb	$p\bar{p}$ at 7 TeV
0.01 $\pm$ 0.20 $\pm$ 0.09	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.45 $^{+0.15}_{-0.21}$ $\pm$ 0.15	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.06 $^{+0.30}_{-0.28}$ $\pm$ 0.05	AALTONEN	11L CDF	Repl. by AALTONEN 12I

NODE=S049FB7

NODE=S049FB7

NEW

 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (10.09 < q^2 < 12.86 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.33 <math>\pm</math> 0.08 OUR AVERAGE</b>			
[0.53 $\pm$ 0.15 OUR 2012 AVERAGE]			
0.27 $^{+0.11}_{-0.13}$ $\pm$ 0.02	AAIJ	12U LHCb	$p\bar{p}$ at 7 TeV
0.38 $^{+0.16}_{-0.19}$ $\pm$ 0.09	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.43 $^{+0.18}_{-0.20}$ $\pm$ 0.03	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.66 $^{+0.23}_{-0.20}$ $\pm$ 0.07	AALTONEN	11L CDF	Repl. by AALTONEN 12I

NODE=S049FBB

NODE=S049FBB

NEW

 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (14.18 < q^2 < 16.0 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.49 <math>\pm</math> 0.06 OUR AVERAGE</b>			
[0.53 $\pm$ 0.13 OUR 2012 AVERAGE]			
0.47 $^{+0.06}_{-0.08}$ $\pm$ 0.03	AAIJ	12U LHCb	$p\bar{p}$ at 7 TeV
0.44 $^{+0.18}_{-0.21}$ $\pm$ 0.10	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.70 $^{+0.16}_{-0.22}$ $\pm$ 0.10	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.42 $\pm$ 0.16 $\pm$ 0.09	AALTONEN	11L CDF	Repl. by AALTONEN 12I

NODE=S049FBC

NODE=S049FBC

NEW

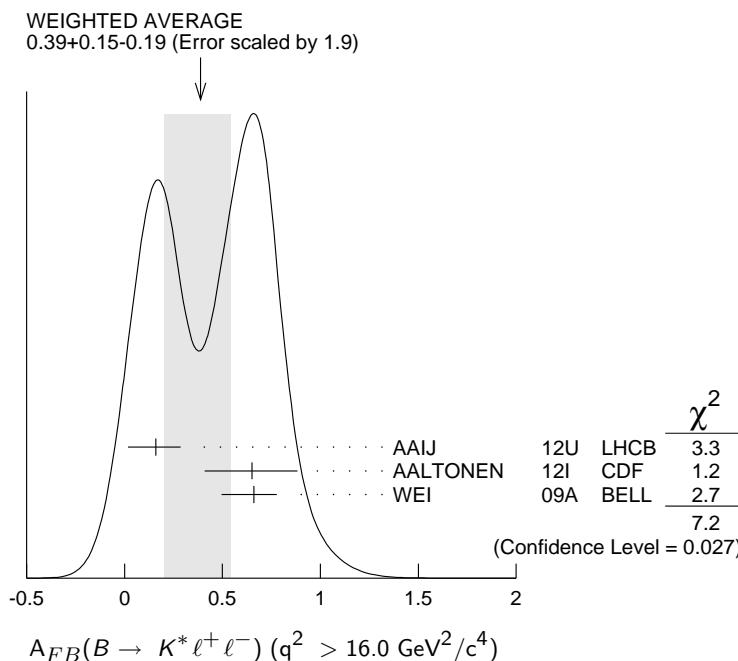
 **$A_{FB}(B \rightarrow K^* \ell^+ \ell^-) (q^2 > 16.0 \text{ GeV}^2/c^4)$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.39 <math>\pm</math> 0.15 OUR AVERAGE</b> Error includes scale factor of 1.9. See the ideogram below.			
[0.67 $\pm$ 0.10 OUR 2012 AVERAGE]			
0.16 $^{+0.11}_{-0.13}$ $\pm$ 0.06	AAIJ	12U LHCb	$p\bar{p}$ at 7 TeV
0.65 $^{+0.17}_{-0.18}$ $\pm$ 0.16	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
0.66 $^{+0.11}_{-0.16}$ $\pm$ 0.04	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.70 $^{+0.16}_{-0.25}$ $\pm$ 0.10	AALTONEN	11L CDF	Repl. by AALTONEN 12I

NODE=S049FBD

NODE=S049FBD

NEW



### $A_{FB}(B \rightarrow K\ell^+\ell^-) (q^2 > 0.1 \text{ GeV}^2/\text{c}^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.11±0.12 OUR AVERAGE</b>			
$0.15^{+0.21}_{-0.23} \pm 0.08$	<sup>1</sup> AUBERT,B	06J BABR	$e^+ e^- \rightarrow \gamma(4S)$
$0.10 \pm 0.14 \pm 0.01$	ISHIKAWA	06 BELL	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Results with different  $q^2$  cuts are also reported.

2 Using an unbinned max. likelihood fits to the  $M_{bc}$  distribution in five  $q^2$  bins for  $\cos \theta > 0$  and  $\cos \theta < 0$ .

### $A_{FB}(B \rightarrow K\ell^+\ell^-) (q^2 < 2.0 \text{ GeV}^2/\text{c}^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.00±0.06 OUR AVERAGE</b>			
[-0.02 ± 0.26 OUR 2012 AVERAGE]			
$0.00^{+0.06}_{-0.05} {}^{+0.03}_{-0.01}$	AAIJ	13H LHCb	$p p$ at 7 TeV
$0.13^{+0.42}_{-0.43} \pm 0.07$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
$0.06^{+0.32}_{-0.35} \pm 0.02$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.15^{+0.46}_{-0.39} \pm 0.08$	AALTONEN	11L CDF	Repl. by AALTONEN 12I

### $A_{FB}(B \rightarrow K\ell^+\ell^-) (2.0 < q^2 < 4.3 \text{ GeV}^2/\text{c}^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.09±0.10 OUR AVERAGE</b> Error includes scale factor of 1.4. [0.2 ± 0.6 OUR 2012 AVERAGE] Scale factor = 2.2]			
AVERAGE Scale factor = 2.2]			
$0.07^{+0.08}_{-0.05} {}^{+0.02}_{-0.01}$	AAIJ	13H LHCb	$p p$ at 7 TeV
$0.32^{+0.15}_{-0.16} \pm 0.05$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
$-0.43^{+0.38}_{-0.40} \pm 0.09$	WEI	09A BELL	$e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.72^{+0.40}_{-0.35} \pm 0.07$	AALTONEN	11L CDF	Repl. by AALTONEN 12I

### $A_{FB}(B \rightarrow K\ell^+\ell^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/\text{c}^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.31±0.16 OUR AVERAGE</b> [0.36 ± 0.26 OUR 2012 AVERAGE]			
AVERAGE Scale factor = 2.2]			
<b>0.31±0.16±0.04</b> AALTONEN 12I CDF $p\bar{p}$ at 1.96 TeV			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.36^{+0.24}_{-0.26} \pm 0.06$	AALTONEN	11L CDF	Repl. by AALTONEN 12I

NODE=S049FB2  
NODE=S049FB2

NODE=S049FB2;LINKAGE=AU  
NODE=S049FB2;LINKAGE=IS

NODE=S049FB8  
NODE=S049FB8

NEW

NODE=S049FB9  
NODE=S049FB9

NEW

NODE=S049FBK  
NODE=S049FBK  
NEW

**$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $1.0 < q^2 < 6.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
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**$0.034^{+0.040}_{-0.029}$  OUR AVERAGE**

[ $-0.01 \pm 0.13$  OUR 2012 AVERAGE]

0.02 $^{+0.05}_{-0.03}$	AAIJ	13H LHCb	$p\bar{p}$ at 7 TeV
0.13 $\pm 0.09$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
$-0.04^{+0.13}_{-0.16}$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.08  $^{+0.27}_{-0.22}$   $\pm 0.07$

AALTONEN 11L CDF Repl. by AALTONEN 12I

 **$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $4.3 < q^2 < 8.6 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
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**$-0.04^{+0.04}_{-0.05}$  OUR AVERAGE**

[ $-0.20^{+0.10}_{-0.13}$  OUR 2012 AVERAGE]

$-0.02^{+0.03}_{-0.05}$ $\pm 0.03$	AAIJ	13H LHCb	$p\bar{p}$ at 7 TeV
$0.01^{+0.13}_{-0.10}$ $\pm 0.01$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
$-0.20^{+0.12}_{-0.14}$ $\pm 0.03$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.20^{+0.17}_{-0.28}$   $\pm 0.03$

AALTONEN 11L CDF Repl. by AALTONEN 12I

 **$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $10.09 < q^2 < 12.86 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
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**$-0.05 \pm 0.06$  OUR AVERAGE**

[ $-0.15^{+0.13}_{-0.12}$  OUR 2012 AVERAGE]

$-0.03 \pm 0.07 \pm 0.01$	AAIJ	13H LHCb	$p\bar{p}$ at 7 TeV
$-0.03^{+0.11}_{-0.10}$ $\pm 0.04$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
$-0.21^{+0.17}_{-0.15}$ $\pm 0.06$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.10^{+0.17}_{-0.15}$   $\pm 0.07$

AALTONEN 11L CDF Repl. by AALTONEN 12I

 **$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $14.18 < q^2 < 16.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

**$-0.02^{+0.07}_{-0.05}$  OUR AVERAGE**

[ $0.03^{+0.27}_{-0.14}$  OUR 2012 AVERAGE]

$-0.01^{+0.12}_{-0.06}$ $\pm 0.01$	AAIJ	13H LHCb	$p\bar{p}$ at 7 TeV
$-0.05^{+0.09}_{-0.11}$ $\pm 0.03$	AALTONEN	12I CDF	$p\bar{p}$ at 1.96 TeV
$0.04^{+0.32}_{-0.26}$ $\pm 0.05$	WEI	09A BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.03^{+0.49}_{-0.16}$   $\pm 0.04$

AALTONEN 11L CDF Repl. by AALTONEN 12I

 **$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $16.0 < q^2 < 18.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
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**$-0.09^{+0.07+0.02}_{-0.09-0.01}$**

AAIJ 13H LHCb  $p\bar{p}$  at 7 TeV

 **$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $18.0 < q^2 < 22.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
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**$0.02 \pm 0.11 \pm 0.01$**

AAIJ 13H LHCb  $p\bar{p}$  at 7 TeV

NODE=S049FBJ

NODE=S049FBJ

NEW

NODE=S049FBA

NODE=S049FBA

NEW

NODE=S049FBG

NODE=S049FBG

NEW

NODE=S049FBH

NODE=S049FBH

NEW

NODE=S049FBL

NODE=S049FBL

NODE=S049FBM

NODE=S049FBM

**$A_{FB}(B \rightarrow K\ell^+\ell^-)$  ( $q^2 > 16.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$0.04^{+0.09}_{-0.07}$  OUR AVERAGE**[ $0.03^{+0.10}_{-0.08}$  OUR 2012 AVERAGE]0.09 $^{+0.17}_{-0.13}$  $\pm 0.03$  AALTONEN 12I CDF  $p\bar{p}$  at 1.96 TeV0.02 $^{+0.11}_{-0.08}$  $\pm 0.02$  WEI 09A BELL  $e^+ e^- \rightarrow \gamma(4S)$ 

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.07 $^{+0.30}_{-0.23}$  $\pm 0.02$  AALTONEN 11L CDF Repl. by AALTONEN 12I **$F_S(B \rightarrow K\ell^+\ell^-)$  ( $q^2 > 0.1 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

 **$0.81^{+0.58}_{-0.61} \pm 0.46$** 1 AUBERT,B 06J BABR  $e^+ e^- \rightarrow \gamma(4S)$ 1 Results with different  $q^2$  cuts are also reported.

NODE=S049FBI

NODE=S049FBI

NEW

NODE=S049FS

NODE=S049FS

NODE=S049FS;LINKAGE=AU

NODE=S049245

NODE=S049245

**ISOSPIN ASYMMETRY** $\Delta_{0-}$  is defined as

$$\frac{\Gamma(B^0 \rightarrow f_d) - \Gamma(B^+ \rightarrow f_u)}{\Gamma(B^0 \rightarrow f) + \Gamma(B^+ \rightarrow f)},$$

the isospin asymmetry of inclusive neutral and charged B decay.

 **$\Delta_{0-}(B(B \rightarrow X_s \gamma))$** 

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$-0.01 \pm 0.06$  OUR AVERAGE**-0.06  $\pm 0.15 \pm 0.07$  1,2 AUBERT 08O BABR  $e^+ e^- \rightarrow \gamma(4S)$   
-0.006 $\pm 0.058 \pm 0.026$  AUBERT,B 05R BABR  $e^+ e^- \rightarrow \gamma(4S)$ 1 The result is for  $E_\gamma > 2.2$  GeV.

2 Uses a fully reconstructed B meson as a tag on the recoil side.

NODE=S049IA1

NODE=S049IA1

 **$\Delta_{0+}(B \rightarrow K^*(892)\gamma)$**  $\Delta_{0+}$  describes the isospin asymmetry between  $\Gamma(B^0 \rightarrow K^*(892)^0 \gamma)$  and  $\Gamma(B^+ \rightarrow K^*(892)^+ \gamma)$ .

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$0.052 \pm 0.026$  OUR AVERAGE**0.066 $\pm 0.021 \pm 0.022$  1 AUBERT 09AO BABR  $e^+ e^- \rightarrow \gamma(4S)$   
0.012 $\pm 0.044 \pm 0.026$  NAKAO 04 BELL  $e^+ e^- \rightarrow \gamma(4S)$ 

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.050 $\pm 0.045 \pm 0.037$  2 AUBERT,BE 04A BABR Repl. by AUBERT 09AO1 Uses the production ratio of charged and neutral B from  $\gamma(4S)$  decays and the lifetime ratio  $\tau_{B^+}/\tau_{B^0} = 1.071 \pm 0.009$ . The 90% CL interval is  $0.017 < \Delta_{0+} < 0.116$ 2 Uses the production ratio of charged and neutral B from  $\gamma(4S)$  decays  $R^+/0 = 1.006 \pm 0.048$  and the lifetime ratio of  $\tau_{B^+}/\tau_{B^0} = 1.083 \pm 0.017$ . The 90% CL interval is  $-0.046 < \Delta_{0+} < 0.146$ .

NODE=S049IA1;LINKAGE=RT

NODE=S049IA1;LINKAGE=UB

NODE=S049IS1

NODE=S049IS1

NODE=S049IS1

 **$\Delta_{\rho\gamma} = \Gamma(B^+ \rightarrow \rho^+ \gamma) / (2 \cdot \Gamma(B^0 \rightarrow \rho^0 \gamma)) - 1$** 

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$-0.46 \pm 0.17$  OUR AVERAGE**-0.43 $^{+0.25}_{-0.22} \pm 0.10$  AUBERT 08BH BABR  $e^+ e^- \rightarrow \gamma(4S)$   
-0.48 $^{+0.21}_{-0.19} \pm 0.08$  TANIGUCHI 08 BELL  $e^+ e^- \rightarrow \gamma(4S)$ 

NODE=S049IA2

NODE=S049IA2

 **$\Delta_{0-}(B(B \rightarrow K\ell^+\ell^-))$** 

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$-0.37 \pm 0.13$  OUR AVERAGE**[-0.40 $^{+0.34}_{-0.30}$  OUR 2012 AVERAGE Scale factor = 1.9]-0.35 $^{+0.23}_{-0.27}$  1 AAIJ 12AH LHCb  $p\bar{p}$  at 7 TeV-0.58 $^{+0.29}_{-0.37} \pm 0.02$  2 LEES 12S BABR  $e^+ e^- \rightarrow \gamma(4S)$ -0.31 $^{+0.17}_{-0.14} \pm 0.08$  3 WEI 09A BELL  $e^+ e^- \rightarrow \gamma(4S)$ 

• • • We do not use the following data for averages, fits, limits, etc. • • •

-1.43 $^{+0.56}_{-0.85} \pm 0.05$  4,5 AUBERT 09T BABR Repl. by LEES 12S

NODE=S049IA3

NODE=S049IA3

NEW

1 For  $1 < q^2 < 6 \text{ GeV}^2/c^4$ .

2 For  $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$ . Measurements in other  $q^2$  bins are also reported.

3 For  $q^2 < 8.68 \text{ GeV}^2/c^4$ .

4 For  $0.1 < m_{\ell^+\ell^-}^2 < 7.02 \text{ GeV}^2/c^4$ .

5 Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

### $\Delta_0 - (B(B \rightarrow K^*\ell^+\ell^-))$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.22±0.10 OUR AVERAGE</b>			
[ $-0.44 \pm 0.13$ OUR 2012 AVERAGE]			Scale factor = 1.1]
-0.15±0.16	1 AAIJ	12AH LHCb	$p\bar{p}$ at 7 TeV
-0.25 <sup>+0.20</sup> <sub>-0.17</sub> ±0.03	2 LEES	12S BABR	$e^+e^- \rightarrow \Upsilon(4S)$
-0.29±0.16±0.09	3 WEI	09A BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.56 <sup>+0.17</sup> <sub>-0.15</sub> ±0.03	4,5 AUBERT	09T BABR	Repl. by LEES 12S
1 For $1 < q^2 < 6 \text{ GeV}^2/c^4$ .			
2 For $0.10 < q^2 < 8.12 \text{ GeV}^2/c^4$ . Measurements in other $q^2$ bins are also reported.			
3 For $q^2 < 8.68 \text{ GeV}^2/c^4$ .			
4 For $0.1 < m_{\ell^+\ell^-}^2 < 7.02 \text{ GeV}^2/c^4$ .			
5 Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .			

### $\Delta_0 - (B(B \rightarrow K^*(\ell^+\ell^-))$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.45±0.17 OUR AVERAGE</b>			
			Error includes scale factor of 1.7.
-0.64 <sup>+0.15</sup> <sub>-0.14</sub> ±0.03	1,2 AUBERT	09T BABR	$e^+e^- \rightarrow \Upsilon(4S)$
-0.30 <sup>+0.12</sup> <sub>-0.11</sub> ±0.08	3 WEI	09A BELL	$e^+e^- \rightarrow \Upsilon(4S)$
1 For $0.1 < m_{\ell^+\ell^-}^2 < 7.02 \text{ GeV}^2/c^4$ .			
2 Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .			
3 For $q^2 < 8.68 \text{ GeV}^2/c^2$ .			

## $B \rightarrow X_c \ell \nu$ HADRONIC MASS MOMENTS

### $\langle M_X^2 - \bar{M}_D^2 \rangle$ (First Moments)

VALUE (GeV <sup>2</sup> )	DOCUMENT ID	TECN	COMMENT
<b>0.36 ±0.08 OUR AVERAGE</b>			
			Error includes scale factor of 1.8.
0.467±0.038±0.068	1 ACOSTA	05F CDF	$p\bar{p}$ at 1.96 TeV
0.293±0.012±0.058	2 CSORNA	04 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.251±0.023±0.062	3 CRONIN-HEN..01B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
1 Moments are measured with a minimum lepton momentum of 0.7 GeV/c in the $B$ rest frame;			
2 Uses minimum lepton energy of 1.5 GeV and also reports moments with $E_\ell > 1.0$ GeV.			
3 The leptons are required to have $P_\ell > 1.5$ GeV/c.			

### $\langle M_X^2 \rangle$ (First Moments)

VALUE (GeV <sup>2</sup> )	DOCUMENT ID	TECN	COMMENT
<b>4.156±0.029 OUR AVERAGE</b>			
4.144±0.028±0.022	1 SCHWANDA	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
4.18 ± 0.04 ± 0.03	1 AUBERT,B	04 BABR	$e^+e^- \rightarrow \Upsilon(4S)$

1 The leptons are required to have  $E_\ell > 1.5$  GeV/c.

### $\langle (M_X^2 - \bar{M}_X^2)^2 \rangle$ (Second Moments)

VALUE (GeV <sup>4</sup> )	DOCUMENT ID	TECN	COMMENT
<b>0.55 ±0.08 OUR AVERAGE</b>			
0.515±0.061±0.064	1 SCHWANDA	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.629±0.031±0.143	2 CSORNA	04 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.05 ± 0.26 ± 0.13	3 ACOSTA	05F CDF	$p\bar{p}$ at 1.96 TeV
0.576±0.048±0.168	1 CRONIN-HEN..01B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

1 The leptons are required to have  $E_\ell > 1.5$  GeV/c.

2 Uses minimum lepton energy of 1.5 GeV and also reports moments with  $E_\ell > 1.0$  GeV.

3 Moments are measured with a minimum lepton momentum of 0.7 GeV/c in the  $B$  rest frame;

NODE=S049IA3;LINKAGE=AA  
 NODE=S049IA3;LINKAGE=LE  
 NODE=S049IA3;LINKAGE=WE  
 NODE=S049IA3;LINKAGE=AU  
 NODE=S049IA3;LINKAGE=EP

NODE=S049IA4  
 NODE=S049IA4  
 NEW

NODE=S049IA4;LINKAGE=AA  
 NODE=S049IA4;LINKAGE=LE  
 NODE=S049IA4;LINKAGE=WE  
 NODE=S049IA4;LINKAGE=AU  
 NODE=S049IA4;LINKAGE=EP

NODE=S049IA5  
 NODE=S049IA5

NODE=S049IA5;LINKAGE=AU  
 NODE=S049IA5;LINKAGE=EP  
 NODE=S049IA5;LINKAGE=WE

NODE=S049230

NODE=S049MX1  
 NODE=S049MX1

NODE=S049MX1;LINKAGE=AC

NODE=S049MX1;LINKAGE=CS  
 NODE=S049MX1;LINKAGE=A

NODE=S049MX4  
 NODE=S049MX4

NODE=S049MX4;LINKAGE=SC

NODE=S049MX2  
 NODE=S049MX2

NODE=S049MX2;LINKAGE=A  
 NODE=S049MX2;LINKAGE=CS  
 NODE=S049MX2;LINKAGE=AC

**$\langle(M_X^2 - \bar{M}_D^2)^2\rangle$  (Second Moments)**

VALUE (GeV <sup>4</sup> )	DOCUMENT ID	TECN	COMMENT
<b>0.639±0.056±0.178</b>	<sup>1</sup> CRONIN-HEN..01B	CLE2	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> The leptons are required to have  $E_\ell > 1.5$  GeV/c.

 **$B \rightarrow X_c \ell \nu$  LEPTON MOMENTUM MOMENTS** **$R_0 (\Gamma_{E_l > 1.7\text{GeV}} / \Gamma_{E_l > 1.5\text{GeV}})$** 

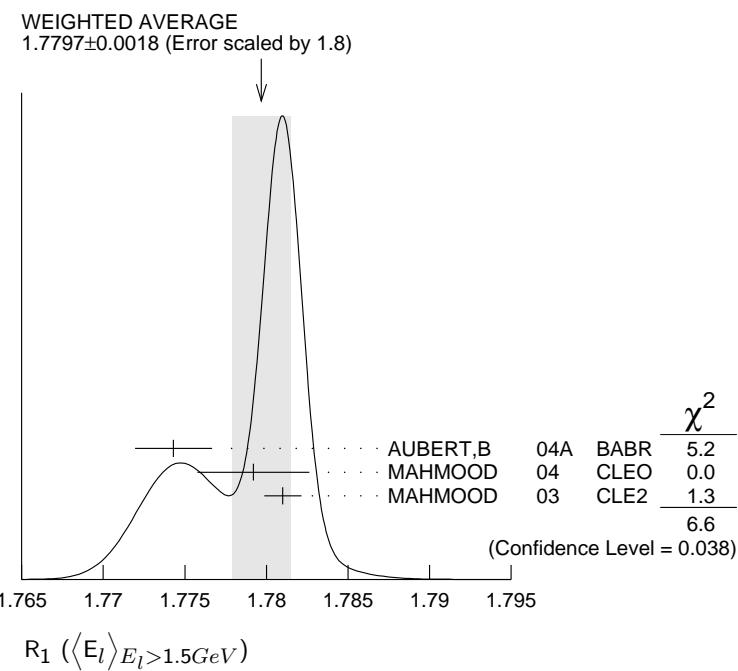
VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.6187±0.0014±0.0016</b>	<sup>1</sup> MAHMOOD	03	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> The leptons are required to have  $E_\ell > 1.5$  GeV in the B rest frame.

 **$R_1 (\langle E_l \rangle_{E_l > 1.5\text{GeV}})$** 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.7797±0.0018 OUR AVERAGE</b>			Error includes scale factor of 1.8. See the ideogram below.

- 1 The leptons are required to have  $E_l > 1.5$  GeV in the B rest frame. The result with  $E_l > 0.6$  GeV is also given.  
 2 Uses  $E_e > 1.5$  GeV and also reports moments with other minimum minimum  $E_e$  conditions, as low as  $E_e > 0.6$  GeV.  
 3 The leptons are required to have  $E_l > 1.5$  GeV in the B rest frame.

 **$R_2 (\langle E_l^2 - \bar{E}_l^2 \rangle_{E_l > 1.5\text{GeV}})$** 

VALUE (10 <sup>-3</sup> GeV <sup>2</sup> )	DOCUMENT ID	TECN	COMMENT
<b>30.8±0.8 OUR AVERAGE</b>			

- 30.3±0.9±0.5  
 31.6±0.8±1.0
- <sup>1</sup> The leptons are required to have  $E_l > 1.5$  GeV in the B rest frame. The result with  $E_l > 0.6$  GeV is also given.  
 2 Uses  $E_e > 1.5$  GeV and also reports moments with other minimum minimum  $E_e$  conditions, as low as  $E_e > 0.6$  GeV.

 **$R_3 (\langle E_l^3 - \bar{E}_l^3 \rangle_{E_l > 1.5\text{GeV}})$** 

VALUE (10 <sup>-3</sup> GeV <sup>3</sup> )	DOCUMENT ID	TECN	COMMENT
<b>2.12±0.47±0.20</b>	<sup>1</sup> AUBERT,B	04A	BABR $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> The leptons are required to have  $E_l > 1.5$  GeV in the B rest frame. The result with  $E_l > 0.6$  GeV is also given.

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**$B \rightarrow X_s \gamma$  PHOTON ENERGY MOMENTS** **$\langle E_\gamma \rangle$** 

VALUE (GeV)

DOCUMENT ID

TECN COMMENT

**2.314±0.011 OUR AVERAGE**

[(2.306 ± 0.014 GeV OUR 2012 AVERAGE)]

2.346 ± 0.018	<sup>+0.027</sup> <sub>-0.022</sub>	1,2 LEES	12U BABR	$e^+ e^- \rightarrow \gamma(4S)$	
2.304 ± 0.014	<sup>+0.017</sup> <sub>-0.017</sub>	2,3 LEES	12V BABR	$e^+ e^- \rightarrow \gamma(4S)$	
2.311 ± 0.009	<sup>+0.015</sup> <sub>-0.015</sub>	3 LIMOSANI	09 BELL	$e^+ e^- \rightarrow \gamma(4S)$	
2.289 ± 0.058	<sup>+0.027</sup> <sub>-0.027</sub>	3,4 AUBERT	080 BABR	$e^+ e^- \rightarrow \gamma(4S)$	
2.309 ± 0.023	<sup>+0.023</sup> <sub>-0.023</sub>	2,3 SCHWANDA	08 BELL	$e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.288 ± 0.025 ± 0.023      3 AUBERT,BE 06B BABR Repl. by LEES 12V

<sup>1</sup> LEES 12U uses  $E_\gamma > 1.897$  GeV to calculate the moments; the moments are used to calculate the HQET parameters  $m_b = 4.579^{+0.032}_{-0.029}$  GeV/c<sup>2</sup> and  $\mu_\pi^2 = 0.257^{+0.034}_{-0.039}$  GeV<sup>2</sup> in the shape function model. The same HQET parameters are also determined in the kinetic model.

2 Results for different  $E_\gamma$  threshold values are also measured.3 The result is for  $E_\gamma > 1.9$  GeV.4 Uses a fully reconstructed  $B$  meson as a tag on the recoil side. **$\langle E_\gamma^2 \rangle - \langle E_\gamma \rangle^2$** VALUE ( $10^{-2}$  GeV<sup>2</sup>)

DOCUMENT ID

TECN COMMENT

**3.03±0.25 OUR AVERAGE**[(2.99 ± 0.28) × 10<sup>-2</sup> GeV<sup>2</sup> OUR 2012 AVERAGE]

2.11 ± 0.57	<sup>+0.55</sup> <sub>-0.69</sub>	1,2 LEES	12U BABR	$e^+ e^- \rightarrow \gamma(4S)$	
3.62 ± 0.33	<sup>+0.33</sup> <sub>-0.33</sub>	2,3 LEES	12V BABR	$e^+ e^- \rightarrow \gamma(4S)$	
3.02 ± 0.19	<sup>+0.30</sup> <sub>-0.30</sub>	3 LIMOSANI	09 BELL	$e^+ e^- \rightarrow \gamma(4S)$	
3.34 ± 1.24	<sup>+0.62</sup> <sub>-0.62</sub>	3,4 AUBERT	080 BABR	$e^+ e^- \rightarrow \gamma(4S)$	
2.17 ± 0.60	<sup>+0.55</sup> <sub>-0.55</sub>	2,3 SCHWANDA	08 BELL	$e^+ e^- \rightarrow \gamma(4S)$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.28 ± 0.40 ± 0.43      3 AUBERT,BE 06B BABR Repl. by LEES 12V

<sup>1</sup> LEES 12U uses  $E_\gamma > 1.897$  GeV to calculate the moments; the moments are used to calculate the HQET parameters  $m_b = 4.579^{+0.032}_{-0.029}$  GeV/c<sup>2</sup> and  $\mu_\pi^2 = 0.257^{+0.034}_{-0.039}$  GeV<sup>2</sup> in the shape function model. The same HQET parameters are also determined in the kinetic model.

2 Results for different  $E_\gamma$  threshold values are also measured.3 The result is for  $E_\gamma > 1.9$  GeV.4 Uses a fully reconstructed  $B$  meson as a tag on the recoil side. **$B^\pm/B^0$  ADMIXTURE REFERENCES**

AAIJ	13H	JHEP 1302 105	R. Aaij <i>et al.</i>	(LHCb Collab.)	REFID=54859
AAIJ	12AH	JHEP 1207 133	R. Aaij <i>et al.</i>	(LHCb Collab.)	REFID=54472
AAIJ	12U	PRL 108 181806	R. Aaij <i>et al.</i>	(LHCb Collab.)	REFID=54215
AALTONEN	12I	PRL 108 081807	T. Aaltonen <i>et al.</i>	(CDF Collab.)	REFID=54206
LEES	12	PR D85 011102	J.P. Lees <i>et al.</i>	(BABAR Collab.)	REFID=53992
LEES	12D	PRL 109 101802	J.P. Lees <i>et al.</i>	(BABAR Collab.)	REFID=54261
LEES	12R	PR D86 032004	J.P. Lees <i>et al.</i>	(BABAR Collab.)	REFID=54385
LEES	12S	PR D86 032012	J.P. Lees <i>et al.</i>	(BABAR Collab.)	REFID=54386
LEES	12U	PR D86 052012	J.P. Lees <i>et al.</i>	(BABAR Collab.)	REFID=54613
LEES	12V	PRL 109 191801	J.P. Lees	(BABAR Collab.)	REFID=54614
Also		PR D86 112008	J.P. Lees <i>et al.</i>	(BABAR Collab.)	REFID=54802
AALTONEN	11AI	PRL 107 201802	T. Aaltonen <i>et al.</i>	(CDF Collab.)	REFID=53836
AALTONEN	11L	PRL 106 161801	T. Aaltonen <i>et al.</i>	(CDF Collab.)	REFID=16443
DEL-AMO-SA...	11	PR D83 031103	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)	REFID=53663
AUBERT	10	PRL 104 011802	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=53189
AUBERT	10A	PR D81 032003	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=53198
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DEL-AMO-SA...	10M	PR D82 051101	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)	REFID=53500
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Also		EPAPS Document No. E-PRLLTAO-102-060910			REFID=53060;ERROR=1
AUBERT	09U	PRL 102 161803	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52830
LIMOSANI	09	PRL 103 241801	A. Limosani <i>et al.</i>	(BELLE Collab.)	REFID=53155
WEI	09A	PRL 103 171801	J.-T. Wei <i>et al.</i>	(BELLE Collab.)	REFID=53061
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AUBERT	08AS	PRL 100 171802	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52367
AUBERT	08BC	PR D78 072007	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52537
AUBERT	08BH	PR D78 112001	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52545
AUBERT	08BJ	PRL 101 171804	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52553

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AUBERT	08N	PRL 100 021801	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52222
Also		PR D79 092002	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52799
AUBERT	08O	PR D77 051103	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=52223
SCHWANDA	08	PR D78 032016	C. Schwanda <i>et al.</i>	(BELLE Collab.)	REFID=52422
TANIGUCHI	08	PRL 101 111801	N. Taniguchi <i>et al.</i>	(BELLE Collab.)	REFID=52449
WEI	08A	PR D78 011101	J.-T. Wei <i>et al.</i>	(BELLE Collab.)	REFID=52409
AUBERT	07AG	PRL 99 051801	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=51862
AUBERT	07C	PR D75 012003	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=51619
AUBERT	07E	PRL 98 051802	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=51633
AUBERT	07L	PRL 98 151802	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=51676
HUANG	07	PR D75 012002	G.S. Huang <i>et al.</i>	(CLEO Collab.)	REFID=51624
SCHWANDA	07	PR D75 032005	C. Schwanda <i>et al.</i>	(BELLE Collab.)	REFID=51648
URQUIJO	07	PR D75 032001	P. Urquijo <i>et al.</i>	(BELLE Collab.)	REFID=51647
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AUBERT,B	06Y	PR D74 091105	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=51498
AUBERT,BE	06B	PRL 97 171803	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=51435
BUCHMULLER	06	PR D73 073008	O.L. Buchmuller, H.U. Flacher	(RHBL)	REFID=52217
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ABAZOV	05O	PRL 95 171803	V.M. Abazov <i>et al.</i>	(D0 Collab.)	REFID=50834
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ARTUSO	05B	PRL 95 261801	M. Artuso <i>et al.</i>	(CLEO Collab.)	REFID=50992
AUBERT	05	PRL 94 011801	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=50366
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IWASAKI	05	PR D72 092005	M. Iwasaki <i>et al.</i>	(BELLE Collab.)	REFID=50945
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AUBERT	04C	PRL 92 111801	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=49670
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AUBERT	04X	PRL 93 011803	B. Aubert <i>et al.</i>	(BABAR Collab.)	REFID=49991
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NISHIDA	04	PRL 93 031803	S. Nishida <i>et al.</i>	(BELLE Collab.)	REFID=49994
ADAM	03B	PR D68 012004	N.E. Adam <i>et al.</i>	(CLEO Collab.)	REFID=49507
AUBERT	03	PR D67 031101	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=49202
AUBERT	03F	PR D67 032002	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=49214
AUBERT	03U	PRL 91 221802	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=49648
BONVICINI	03	PR D68 011101	G. Bonvicini <i>et al.</i>	(CLEO Collab.)	REFID=49503
HUANG	03	PRL 91 241802	H.-C. Huang <i>et al.</i>	(BELLE Collab.)	REFID=49621
ISHIKAWA	03	PRL 91 261601	A. Ishikawa <i>et al.</i>	(BELLE Collab.)	REFID=49641
KANEKO	03	PRL 90 021801	J. Kaneko <i>et al.</i>	(BELLE Collab.)	REFID=49165
KROKOVNY	03B	PRL 91 262002	P. Krokovny <i>et al.</i>	(BELLE Collab.)	REFID=49615
MAHMOOD	03	PR D67 072001	A.H. Mahmood <i>et al.</i>	(CLEO Collab.)	REFID=49211
ABE	02	PRL 88 021801	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=48518
ABE	02L	PRL 89 011803	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=48691
ABE	02Y	PL B547 181	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=49005
ANDERSON	02	PRL 89 282001	S. Anderson <i>et al.</i>	(CLEO Collab.)	REFID=49292
AUBERT	02C	PRL 88 101805	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=48600
AUBERT	02G	PR D65 091104	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=48638
AUBERT	02L	PRL 88 241801	B. Aubert <i>et al.</i>	(BaBar Collab.)	REFID=48751
BORNHEIM	02	PRL 88 231803	A. Bornheim <i>et al.</i>	(CLEO Collab.)	REFID=48709
EDWARDS	02B	PR D65 111102	K.W. Edwards <i>et al.</i>	(CLEO Collab.)	REFID=48799
ABE	01F	PL B511 151	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=48171
ABE	01J	PR D64 072001	K. Abe <i>et al.</i>	(BELLE Collab.)	REFID=48342
ANDERSON	01B	PRL 87 181803	S. Anderson <i>et al.</i>	(CLEO Collab.)	REFID=48389
CHEN	01	PR D63 031102	S. Chen <i>et al.</i>	(CLEO Collab.)	REFID=48225
CHEN	01C	PRL 87 251807	S. Chen <i>et al.</i>	(CLEO Collab.)	REFID=48532
COAN	01	PRL 86 5661	T.E. Coan <i>et al.</i>	(CLEO Collab.)	REFID=48240
CRONIN-HEN...01B		PRL 87 251808	D. Cronin-Hennessy <i>et al.</i>	(CLEO Collab.)	REFID=48533
PDG	01	Unofficial 2001 WWW edition			REFID=49189;ERROR=3
ABREU	00R	PL B475 407	P. Abreu <i>et al.</i>	(DELPHI Collab.)	REFID=47657
COAN	00	PRL 84 5283	T.E. Coan <i>et al.</i>	(CLEO Collab.)	REFID=47633
RICHICHI	00	PRL 85 520	S.J. Richichi <i>et al.</i>	(CLEO Collab.)	REFID=47660
BARATE	98Q	EPJ C4 387	R. Barate <i>et al.</i>	(ALEPH Collab.)	REFID=46146
BERGFELD	98	PRL 81 272	T. Bergfeld <i>et al.</i>	(CLEO Collab.)	REFID=46091
BISHAI	98	PR D57 3847	M. Bishai <i>et al.</i>	(CLEO Collab.)	REFID=45870
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COAN	98	PRL 80 1150	T.E. Coan <i>et al.</i>	(CLEO Collab.)	REFID=45872
GLENN	98	PRL 80 2289	S. Glenn <i>et al.</i>	(CLEO Collab.)	REFID=45869
ACKERSTAFF	97N	ZPHY C74 423	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)	REFID=45488
AMMAR	97	PR D55 13	R. Ammar <i>et al.</i>	(CLEO Collab.)	REFID=45263
BARISH	97	PRL 79 3599	B. Barish <i>et al.</i>	(CLEO Collab.)	REFID=45717
BUSKULIC	97B	ZPHY C73 601	D. Buskulic <i>et al.</i>	(ALEPH Collab.)	REFID=45294

GIBBONS	97B	PR D56 3783	L. Gibbons <i>et al.</i>	(CLEO Collab.)	REFID=45668
ALBRECHT	96D	PL B374 256	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=44891
BARISH	96B	PRL 76 1570	B.C. Barish <i>et al.</i>	(CLEO Collab.)	REFID=44693
GIBAUT	96	PR D53 4734	D. Gibaut <i>et al.</i>	(CLEO Collab.)	REFID=44784
KUBOTA	96	PR D53 6033	Y. Kubota <i>et al.</i>	(CLEO Collab.)	REFID=44786
PDG	96	PR D54 1	R. M. Barnett <i>et al.</i>	(CLEO Collab.)	REFID=44495
ALAM	95	PRL 74 2885	M.S. Alam <i>et al.</i>	(CLEO Collab.)	REFID=44192
ALBRECHT	95D	PL B353 554	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=44352
BAEST	95B	PR D52 2661	R. Balest <i>et al.</i>	(CLEO Collab.)	REFID=44415
BARISH	95	PR D51 1014	B.C. Barish <i>et al.</i>	(CLEO Collab.)	REFID=44139
BUSKULIC	95B	PL B345 103	D. Buskulic <i>et al.</i>	(ALEPH Collab.)	REFID=44127
ALBRECHT	94C	ZPHY C62 371	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=43912
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PROCARIO	94	PRL 73 1472	M. Procario <i>et al.</i>	(CLEO Collab.)	REFID=43735
ALBRECHT	93	ZPHY C57 533	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=43269
ALBRECHT	93E	ZPHY C60 11	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=43514
ALBRECHT	93H	PL B318 397	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=43633
ALBRECHT	93I	ZPHY C58 191	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=44171
ALEXANDER	93B	PL B319 365	J. Alexander <i>et al.</i>	(CLEO Collab.)	REFID=43725
ARTUSO	93	PL B311 307	M. Artuso	(SYRA)	REFID=43792
BARTELT	93B	PRL 71 4111	J.E. Bartelt <i>et al.</i>	(CLEO Collab.)	REFID=43642
ALBRECHT	92E	PL B277 209	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41985
ALBRECHT	92G	ZPHY C54 1	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=42037
ALBRECHT	92O	ZPHY C56 1	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=43148
BORTOLETTO	92	PR D45 21	D. Bortoletto <i>et al.</i>	(CLEO Collab.)	REFID=41920
CRAWFORD	92	PR D45 752	G. Crawford <i>et al.</i>	(CLEO Collab.)	REFID=42008
HENDERSON	92	PR D45 2212	S. Henderson <i>et al.</i>	(CLEO Collab.)	REFID=42014
LESIAK	92	ZPHY C55 33	T. Lesiak <i>et al.</i>	(Crystal Ball Collab.)	REFID=42108
ALBRECHT	91C	PL B255 297	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41454
ALBRECHT	91H	ZPHY C52 353	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41875
FULTON	91	PR D43 651	R. Fulton <i>et al.</i>	(CLEO Collab.)	REFID=41391
YANAGISAWA	91	PRL 66 2436	C. Yanagisawa <i>et al.</i>	(CUSB II Collab.)	REFID=41703
ALBRECHT	90	PL B234 409	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41040
ALBRECHT	90H	PL B249 359	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41412
BORTOLETTO	90	PRL 64 2117	D. Bortoletto <i>et al.</i>	(CLEO Collab.)	REFID=41178
Also		PR D45 21	D. Bortoletto <i>et al.</i>	(CLEO Collab.)	REFID=41920
FULTON	90	PRL 64 16	R. Fulton <i>et al.</i>	(CLEO Collab.)	REFID=41039
MASCHMANN	90	ZPHY C46 555	W.S. Maschmann <i>et al.</i>	(Crystal Ball Collab.)	REFID=41224
PDG	90	PL B239 1	J.J. Hernandez <i>et al.</i>	(IFIC, BOST, CIT+)	REFID=40744
ALBRECHT	89K	ZPHY C42 519	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=41112
ISGUR	89B	PR D39 799	N. Isgur <i>et al.</i>	(TNTO, CIT)	REFID=41916
WACHS	89	ZPHY C42 33	K. Wachs <i>et al.</i>	(Crystal Ball Collab.)	REFID=40855
ALBRECHT	88E	PL B210 263	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=40595
ALBRECHT	88H	PL B210 258	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=40652
KOERNER	88	ZPHY C38 511	J.G. Korner, G.A. Schuler	(MANZ, DESY)	REFID=43791
ALAM	87	PRL 59 22	M.S. Alam <i>et al.</i>	(CLEO Collab.)	REFID=40380
ALAM	87B	PRL 58 1814	M.S. Alam <i>et al.</i>	(CLEO Collab.)	REFID=40382
ALBRECHT	87D	PL B199 451	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=40325
ALBRECHT	87H	PL B187 425	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=40379
BEAN	87	PR D35 3533	A. Bean <i>et al.</i>	(CLEO Collab.)	REFID=40383
BEHRENDS	87	PRL 59 407	S. Behrends <i>et al.</i>	(CLEO Collab.)	REFID=40386
BORTOLETTO	87	PR D35 19	D. Bortoletto <i>et al.</i>	(CLEO Collab.)	REFID=40381
ALAM	86	PR D34 3279	M.S. Alam <i>et al.</i>	(CLEO Collab.)	REFID=40324
BALTRUSAIT...	86E	PRL 56 2140	R.M. Baltrusaitis <i>et al.</i>	(Mark III Collab.)	REFID=11477
BORTOLETTO	86	PRL 56 800	D. Bortoletto <i>et al.</i>	(CLEO Collab.)	REFID=11613
HAAS	86	PRL 56 2781	J. Haas <i>et al.</i>	(CLEO Collab.)	REFID=11614
ALBRECHT	85H	PL 162B 395	H. Albrecht <i>et al.</i>	(ARGUS Collab.)	REFID=11608
CSORNA	85	PRL 54 1894	S.E. Csorna <i>et al.</i>	(CLEO Collab.)	REFID=11610
HAAS	85	PRL 55 1248	J. Haas <i>et al.</i>	(CLEO Collab.)	REFID=11611
AVERY	84	PRL 53 1309	P. Avery <i>et al.</i>	(CLEO Collab.)	REFID=11572
CHEN	84	PRL 52 1084	A. Chen <i>et al.</i>	(CLEO Collab.)	REFID=11601
LEVMAN	84	PL 141B 271	G.M. Levman <i>et al.</i>	(CUSB Collab.)	REFID=11605
ALAM	83B	PRL 51 1143	M.S. Alam <i>et al.</i>	(CLEO Collab.)	REFID=11587
GREEN	83	PRL 51 347	J. Green <i>et al.</i>	(CLEO Collab.)	REFID=11592
KLOPFEN...	83B	PL 130B 444	C. Klopfenstein <i>et al.</i>	(CUSB Collab.)	REFID=11593
ALTARELLI	82	NP B208 365	G. Altarelli <i>et al.</i>	(ROMA, INFN, FRAS)	REFID=41915
BRODY	82	PRL 48 1070	A.D. Brody <i>et al.</i>	(CLEO Collab.)	REFID=11582
GIANNINI	82	NP B206 1	G. Giannini <i>et al.</i>	(CUSB Collab.)	REFID=11583
BEBEK	81	PRL 46 84	C. Bebek <i>et al.</i>	(CLEO Collab.)	REFID=11578
CHADWICK	81	PRL 46 88	K. Chadwick <i>et al.</i>	(CLEO Collab.)	REFID=11579
ABRAMS	80	PRL 44 10	G.S. Abrams <i>et al.</i>	(SLAC, LBL)	REFID=12114